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Automated Management Systems: Prospects and Problems of Use By Modern Enterprises

Annotation: the article is devoted to the study of the prospects and problems of using automated control systems. In a word, the author explores the essence of automated control systems, their types and functions. The advantages and disadvantages of automated control systems are considered. The structure of complex automated control systems in the enterprise is briefly described. The all importance of enterprise automation and the use of information technology has been substantiated. Automated control systems are relevant and effectively used in any organization.

Key words: automated control systems, information processing, production, industrial enterprises, information technologies, enterprise automation, information processing.

JEL classification: A100, A110, A130.

Introduction

Well, the priorities of the scientific and technological development of the Russian Federation are aimed at modernizing the economy to ensure sustainable external development. The Decree of the President of the Russian Federation by 01.12.2016 No. 642 «On the Strategy for the Scientific and Technological Development of the Russian Federation» gives the concept
of «competitiveness» [4]. It is competitiveness that becomes the key driver not only for the entire national economy, but also and individual enterprises. Anyway, competitiveness is ensured by the quality of products and services that depend on the efficiency of enterprise management. To improve the competitiveness of products and services can be used automated control systems.

Many scientists have studied the issues of business involvement in the innovation process and the introduction of automated control systems to increase efficiency. For example, such scientists as P. Drucker [4], I. Kirzner [8], L. Mises [13], J. Rifkin [14], M. Friedman [6], J. Schumpeter [17] and others. Domestic scientists, for instance, M.Yu. Kulikov and A.E. Khachaturov [11], M.E. Zykov [20], V.A. Tsvetkov and O.S. Sukharev [19], A.V. Babkin [3] and many others studied the problems of introducing automated technologies into the operational activities of enterprises. However, changing the essence of technological innovation and the emergence of new products on the market argues the importance of continuous adaptation of management systems to use automation technologies.

The most important aim of the study – an analysis of the prospects and problems of using automated control systems. Research objectives: to consider the nature, types and functions of automated control systems; to study the possible and priority use of automated control systems; clarify the problems and prospects for the use of automated control systems.

Methodology
So many different methods are used to analyze the scientific literature (to determine the theoretical foundations and practical aspects of automated control systems, the nature and potential results of their introduction into the business), graphic modeling, general theoretical and heuristic methods (analysis, synthesis, specification, comparison).

Results
In this way, automated control system (ACS) is an information system in which there are software and hardware. They are specially designed for automated work of any activity, as well as for storing and processing information [10, p. 22].

The structure of the automated control system consist of the subsystems: functional and supporting ones. The functional subsystem includes a number of functions that solve individual tasks, such as data accounting and activity regulation. The providing subsystem includes data, integrity and documentation [1, p. 48].

The main aim of introducing an automated control system is to create a system-technical environment because the environment allows staff to work with electronic documents and automated presentation of information about all business processes. Automated systems allow:
- in the first place, creation of a structured information base (multi-user access to documentation);
- secondly, parallel work with electronic resources, text editors through the application interface;
- moreover, accounting for workflow on the flow of information with which the user works;
- besides, automated search in the information database;
- what is more, control on maintaining documents;
- last but not least, implementation of the project, which fully complies with the rules of documentation at this enterprise [12, p. 42].

The use of automated enterprise management systems is shown in Figure 1 «The functioning and development of complex control systems» to make its perception easier. The functioning and development of complex control systems.

In this way, the figure shows the elements and processes of automated control systems. An important practical value of automated control systems for technologically complex and multidimensional tasks. Among them are the following:
Nevertheless, this is not a complete list of processes that will show themselves from the positive side after the introduction of automated control systems. It is necessary to pay attention to the typology of existing automated control systems. Depending on the role of man in the management process in enterprises, automated systems are divided into:

- information and reference: perform the process of processing and issuing reference information;
- informational advising: automate the operations of collecting, transmitting, processing and converting;
- self-adjusting and self-learning: give commands to performers according to special programs.

For industrial enterprises, it is important to classify automated control system by classes of management structures. In this case, a decentralized, centralized, distributed, and hierarchical ACS are distinguished. So, they repeat the internal control system in their structure and automate it [16].

In practice, the use of automated control systems means the use of special software. In our modern world, there are very few similar systems of Russian developers on the software market. In this way, analysis of the functions that are most common on the Russian software market: “1C: Enterprise 8. Manufacturing Enterprise Management” (1C: ERP), “Parus – Enterprise 8”, “Galaxy ERP”, and “BEST-5” showed that typical software solutions. The considered automated information systems do not have a quality management module for the products / services produced. Only ERP-system “Galaxy” has a special solution “Quality Management” [18].

By the way, automated quality management systems are widely represented on the foreign software market, and many of them are oriented for implementation at the enterprises of the pharmaceutical and food industry, medical instrumentation, bioengineering, and even in companies that provide passenger transportation services by air and rail. There are some good examples of automated quality management systems include the SAP ERP, Master Control Quality Management Software System, EtQ Quality Management Software, Intelex Quality Management System, Novatek International Quality Management System, NICE Quality Management, IBS QSI System Software, Clarmen Quality Management System.

Discussion

Currently, not all enterprises use automated systems. There are the following reasons for not using the automated control system what need to be mentioned:
– insufficient automation of the whole complex of economic activities of the enterprise;
– poor understanding of the benefits of automated control in production;
– there are not enough specialists who could monitor the correct performance of the control system;
– high cost of equipment;
– many employees understand that they can supply a replacement car and oppose progress [9, p. 55].

It is important to note that many managers of large industrial enterprises still do not see the benefits of management automation. Most of them consider only the negative qualities of progress, deeply mistaken.

It goes without saying, that if you replace half of the employees with automated management systems, you can save on staff salaries, as they will be less, and it will be possible to increase the salaries of engineers, who would monitor the correct operation of the machine, mechanism, and the entire enterprise management system and as a result all automation costs will pay off. To simplify understanding and perception of information, the identified priority factors for the use of automated control system by modern enterprises are shown in Table 1 “Priorities for the use of automated control systems for modern enterprises”.

### Table 1

<table>
<thead>
<tr>
<th>No.</th>
<th>Priority opportunities</th>
<th>Potential effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The implementation of full process automation</td>
<td>Changing human role in management, eliminating the “human factor”, increasing the level of controllability, reducing equipment failures, energy losses and other economic resources, increasing the intellectual capital of an enterprise</td>
</tr>
<tr>
<td>2</td>
<td>Ensuring reliable and stable operation of production equipment</td>
<td>Reducing crashes and their duration, economic and social losses, increasing customer confidence</td>
</tr>
<tr>
<td>3</td>
<td>Implementation of the client-oriented approach</td>
<td>Satisfying customers’ needs and solving their problems by expanding the services provided, increasing customer satisfaction</td>
</tr>
<tr>
<td>4</td>
<td>The possibility of optimizing the work of production equipment</td>
<td>Reducing uneven utilization of enterprises and energy consumption, improving the economic, environmental and social efficiency of enterprises</td>
</tr>
<tr>
<td>5</td>
<td>Optimal management of the maintenance and use enterprise assets</td>
<td>Extending the service life of equipment and increasing its operational readiness, reducing investment and operating costs</td>
</tr>
<tr>
<td>6</td>
<td>The ability to receive real-time information about the consequences of decision making</td>
<td>Availability of information, the ability to make optimal (rational) decisions</td>
</tr>
</tbody>
</table>

At the same time, there are also problematic aspects of automated control systems for modern enterprises, which mainly concern the issues of their implementation in the management process. To put it briefly, the identified problem areas are shown in Table 2 «Cons» and the reasons for their occurrence in automated control systems in enterprises».

In this way, the automation of enterprise management is a priority for all. It is no great surprise, that the owner will be able to benefit, by improving their working composition, productivity and reducing errors, when performing any tasks. It should not be forgotten, that the distribution of resources in the enterprise should be even, and if you look for only one benefit, the whole business will soon be ruined.
“Cons” and the reasons for their occurrence in automated control systems in enterprises

<table>
<thead>
<tr>
<th>«Cons»</th>
<th>Causes of «cons»</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expensive equipment</td>
<td>Often, business owners do not see the benefit in dismissing a whole sector of workers, and putting the car to work for them. Leaving, hiring at the same time only one highly qualified specialist</td>
</tr>
<tr>
<td>Lack of highly qualified specialists</td>
<td>Here we are faced with the problem of not a shortage, but rather the inability of the manager to contribute to the training of his specialists, to a higher level, in terms of their qualifications</td>
</tr>
<tr>
<td>Long payback time</td>
<td>If the machine is less wrong, then payback will increase significantly. The machine works according to a prescribed program, which is registered in its software, it cannot “deviate from the intended course”</td>
</tr>
<tr>
<td>The “greed” of shareholders</td>
<td>Indeed, the main reason is that entrepreneurs seek for their own benefit, and not for the benefit of the enterprise. This is where the entire enterprise automation process stops</td>
</tr>
</tbody>
</table>

Taking into account the identified problems and prospects for the use of automated control systems, at this stage of the study, a model was developed for the transformation of the management environment, describing the process of successful implementation of the automated control system in the enterprise (Figure 2 «The transformation model of the enterprise management environment for the implementation of automated control system»).

Figure 2. The transformation model of the enterprise management environment for the implementation of automated control system

As subjects of transformation of the management environment of the enterprise, the management staff (coordinates the implementation of the automated control system), the executive staff (implements certain measures for the implementation of the automated control system) and the interested parties (shareholders, suppliers, consumers, the local community who are affected by the improvement of the quality of management processes)). In one word, the
object of transformation is the technological process at the enterprise (main activity). On the other hand, the subject of transformation is considered an automated system as an innovative technology of the organization of the technological process.

Additionally, it is recommended to ensure in advance the conditions for the successful implementation of automated control systems at the level of individual functional processes of the enterprise. As the results of the study showed, the automated control system affects the most diverse areas of management, therefore, changes affecting various functional subsystems (FB) will be observed: personnel management, production management, financial management, etc. We propose to distinguish these changes at three levels (Figure 3 «Levels of managerial changes necessary for the successful implementation of the automated control system in the activities of the enterprise»).

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**Figure 3. Levels of managerial changes necessary for the successful implementation of the automated control system in the activities of the enterprise**

As well, let us pay some attention to the conditions for successful transformation of the management environment for the implementation of the automated control system in order to minimize the previously established problems of the automated control system implementation that occur in the practice of the enterprise. From our point of view, it is necessary to ensure changes in the three environments associated with personnel, information and technical and technological sphere as the main activity of enterprises (Figure 4 «Model of conditions for...»).

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1 The abbreviation «FB» with subsystem number under the term «functional subsystem» will be used further in the text. Example: FB1 – functional subsystem 1, etc.
successful transformation of the enterprise management environment for the implementation of automated control systems»).

Figure 4. Model of conditions for successful transformation of the enterprise management environment for the implementation of automated control systems

In relation to staff, it is proposed to highlight the following conditions for the successful transformation of the management environment:

1) reassessment of the role of man in the technical and technological process (the management of the enterprise needs to understand that on the background of the introduction of the automated control system, the role of human labor will change significantly, which will entail a review of personnel policy);

2) elimination of “unnecessary” positions of personnel subject to automation (a wide range of functions of the automated control system will reduce staffing, thereby reducing the costs of staff and material and technical support for their work);

3) continuous improvement of staff information competence (those employees whose work activity can be automated only partially or not at all under automation should constantly develop their information competence – learn to interact with new information technologies and software designed for working with data arrays).

In relation to the interactive environment of the enterprise, the following conditions of successful transformation are highlighted:

1) flexibility of the used principles of making management decisions (mainly the automated control system allows the specialist to make more competent management decisions at the expense of substantial information about their objects);

2) perception of information as a key value in management (the very content of the management decision-making process should be closely related to the interactive environment: information is regarded as a key value, whose resources become arguments in making management decisions);

3) continuous improvement of the interactive environment (along with the development of automated control systems in technical terms, it is important to continuously improve the interactive environment – the link that stands between the control system and the person, in other words, a peculiar data array interface, with which the specialist works).

In relation to the technical and technological environment of the enterprise, it is recommended to consider the following conditions for successful transformation:
1) orientation to the self-control of machines and mechanisms (the control functions of technical personnel for setting up the operation of industrial equipment and its uninterrupted functioning should be reduced to a minimum due to the presence of self-control functions of the automated control system);

2) continuous search for technologies that increase the accuracy of operations (the main value of the information provided by the automated control system is its accuracy, which allows to calculate various aspects of production processes objectively, which makes it possible to predict production capacity, quality of products, etc., while maximum accuracy of information through the creation, search and testing of relevant technologies);

3) focus on increasing environmental factors in production (finally, any company strives to improve the environmental friendliness of its industrial complex, which also requires an accurate calculation of the impact of certain production processes on the environment).

Conclusion
Taking everything into consideration, it is worth noting that we can conclude that the automated control system is a complex system complex, due to its multi-tasking. All in all, automated control system is defined as a set of automated technologies intended for information service. Consequently, a specialized set of software tools shows the high efficiency of their use, the software package is displayed in the effective organization of work, the accuracy of work planning, reduction of manual labor and the implementation of the tasks provided by the program.

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The Development of the System of Statistical Indicators of the Average Wage

Annotation: in modern conditions of economic development, it is necessary to develop a system of statistical indicators of wages, since wages are an important part of the wage system and incentives for labor. The article deals with the organization of Russian wage statistics. The description of the system of statistical indicators of wages, methodology and information sources for their formation is presented. The formation of wage statistics for those categories of workers for which wage increase measures are foreseen is relevant, primarily due to the need to monitor the May Decrees of the President of the Russian Federation.

Key words: labor statistics, wage statistics, statistical observation, subjects of statistical observation, system statistical indicators of wages.

JEL classification: A100, A110, A130.

Introduction
Formation of official statistical information on the number and accrued wages of employees of organizations in the Russian Federation, constituent entities of the Russian Federation, federal districts, and types of economic activity is traditionally carried out by Rosstat based on complete and selective statistical surveys of organizations of all types of economic activity and all forms of ownership conducted at different intervals based on the qualification method.

Thus, for organizations that are not small businesses, observation is carried out by a continuous method. Most of them report on the form of federal statistical observation No. P-4 «Information on the number and wages of workers» [3]. At the same time, organizations whose average number of employees exceeds 15 people (including those working under civil law contracts and part-time work) report every month, and organizations whose average number of employees does not exceed 15 people are quarterly. A relatively small circle of large and medium-sized organizations, the average number of employees does not exceed 15 people (in particular, public organizations, country and horticultural partnerships, consumer cooperatives, etc.) can provide information once a year on the form of federal statistical observation No. 1-T «Information about the number and wages of workers». To public authorities, ensuring the protection of public safety and defense, the procedure for providing information on form No. 1-T in a special order once a year shall be established by separate guidance documents.

Small enterprises (except microenterprises) are surveyed quarterly on a selective basis – according to form No. PM «Information on the main indicators of the activity of a small enterprise» [3].
Micro-enterprises are surveyed with an annual periodicity on a sample basis – according to form No. MP (micro) «Information on the main indicators of micro-enterprise activity» [3].

Considering that monthly and quarterly information on the number and accrued wages of workers is provided by only a part of organizations (although the most numerous in terms of employee coverage), Rosstat monthly carries out a statistical assessment of key indicators for the full range of organizations (for the Russian Federation, federal districts and subjects of the Russian Federation types of economic activity). These indicators include:

- average number of employees;
- payroll fund of all employees;
- the payroll fund of payroll employees and external part-time workers;
- the average monthly wage of workers.

Summary data for the full range of organizations is developed once a year based on the integration of aggregated data of monthly, quarterly and annual statistical observations of organizations. These indicators include the average number of employees, the payroll fund, the amount of social payments, the average monthly wage of employees for an average year in the following sections:

- for the Russian Federation;
- for federal districts and subjects of the Russian Federation;
- by type of economic activity;
- ownership.

The salary fund includes the wage amounts accrued by organizations to employees (including personal income tax and other deductions in accordance with the legislation of the Russian Federation) for time worked and time not spent, compensation payments related to working conditions and working hours, bonuses and surcharges, bonuses, one-time incentive payments, as well as payment for food and accommodation, which is systematic.

The average salary in an organization is calculated by dividing the amount of the fund for the accrued wages of employees by the number of employees and the number of months in a period. The average wage is calculated separately for each category of workers: the average number of employees; the average number of external partitions; average number of employees performing work under civil law contracts.

In general, for the economy of Russia and the subjects of the Russian Federation, the average monthly wage is calculated by dividing the fund of accrued wages of payroll employees, external part-timers and non-payroll staff (including the amounts accrued to employees under civil law contracts) by the average number of employees and the number of months in the reporting period.

By type of economic activity, the average monthly wage is calculated by dividing the fund of the accrued wages of payroll employees and external part-time workers by the average number of employees and the number of months in the reporting period.

**Methods**

Starting from 2016, a new wage indicator has been introduced in the statistical practice for monitoring the implementation of the «May» decrees of the President of the Russian Federation (hereinafter referred to as «May decrees») – the average wage of employees in organizations, individual entrepreneurs and individuals.

The development of this indicator has become possible due to the organization in the Russian Federation of a system of federal statistical observations on socio-demographic problems, and above all the selective observation of population income and its participation in social programs (hereinafter referred to as ODN).

The system of socio-demographic surveys is designed to develop measures of demographic and social policy, quantify their effectiveness, as well as assess the impact on the demographic situation in the country and on the living standards of various population groups and improve the monitoring of the implementation of government programs.
The task of conducting ODN is to obtain statistical data:
- on the monetary and total income of households;
- about the types of income sources and the number of income recipients in families;
- on the conditions for obtaining and the amount of income from employment, self-employment (including personal subsidiary farms);
- about the volume of in-kind income of goods and services of own production in cash equivalent;
- about the types and amounts of pensions and social benefits, insurance claims and contributions to voluntary insurance;
- on the amount of income from participation in family benefits and social protection programs;
- about the availability of income from property, about the volume of interfamily assistance;
- about the paid taxes and tax benefits, the volume of mandatory payments and debt burden.

ODN is based on a sample survey of representatives of various groups and segments of the population living in all constituent entities of the Russian Federation, with coverage in 2012 – 10 thousand households, in 2014 and 2015 – 45 thousand households, starting from 2016 annually – 60 thousand households in 2017 and 2022 – 160 thousand households.

The general population, which serves as the basis for constructing a sample population when conducting observations in the constituent entities of the Russian Federation, consists of all private households residing in the territory of the Russian Federation. The formation of a sample of households is carried out on the basis of the principles of random selection.

In terms of remuneration, the following indicators are formed on the basis of the ODN: total income from employment, including remuneration of employees; income from self-employment; income from regular employment not related to a specific type of employment. The listed indicators are developed based on the average per household and on average per household member for the following socio-demographic groups:
- at the place of residence;
- by the number of children under the age of 18;
- by the number of employed persons;
- by main social groups of households (by the presence of children under the age of 18; by the presence of large, young and single-parent families in households; by households consisting of (only) pensioners or (only) of persons with disabilities);
- by the number of employees, the presence and number of children under the age of 18;
- by categories of households, depending on gender, age and position in the economic activity of the head of household.

The method of calculating the average monthly wage of employees in organizations, individual entrepreneurs and individuals is approved by order of Rosstat. It is based on the use of new indicators formed on the basis of the ODN – the average hourly wage of employees in organizations, as well as among employees of individual entrepreneurs and individuals.

Results

The results of the calculations are published on the website of Rosstat [3].

In accordance with the instructions of the Government of the Russian Federation, starting from 2017, Rosstat has been developing quarterly (since the beginning of the year) estimates of this indicator in order to ensure the implementation of the current (quarterly) monitoring of the “May decrees”.

Federal statistical monitoring in the field of remuneration of certain categories of workers for which wage increases are envisaged is carried out in accordance with the instructions of the President and the Government [12] in order to monitor the “May decrees” [9].

The observation is carried out on a quarterly basis, starting in 2013.
Development of information is carried out on the basis of forms of federal statistical observation:
- No. ZP-education «Information on the number and remuneration of employees in the field of education by categories of personnel»;
- No. ZP-culture «Information on the number and remuneration of workers in the cultural sphere by categories of personnel»;
- No. ZP-science «Information on the number and remuneration of employees engaged in research and development, by categories of personnel»;
- No. ZP-social «Information on the number and remuneration of workers in the sphere of social services by categories of personnel»;
- No. ZP-health «Information on the number and remuneration of health workers by categories of personnel» \[3\].

The respondents who are subject to federal statistical observation are legal entities (and their separate subdivisions) of state and municipal forms of ownership, operating in the fields of education, health care, culture, social services and science.

Observation is carried out on the basis of a continuous method.

According to the results of federal statistical observation in the field of labor remuneration of certain categories of workers, summary (aggregated) data are generated for the following indicators:
- the level of the average wage of workers of the corresponding category in organizations of state and municipal forms of ownership;
- the ratio of the average wage \[10\] of workers of the corresponding category in state and municipal organizations of ownership to the average wage in the subject of the Russian Federation \[11\];
- the number of employees of the relevant category in state and municipal organizations;
- the fund of accrued wages of workers of the corresponding category in organizations of state and municipal forms of ownership;
- the composition of the fund for the accrued wages of workers of the corresponding category in state and municipal organizations of ownership by sources of financing (funds of budgets of all levels, OMS, funds from income-generating activities). The data is generated in the following categories of workers:
  1) pedagogical workers of preschool educational institutions;
  2) pedagogical workers of educational institutions of general education, including teachers;
  3) teaching staff of institutions of additional education of children;
  4) teachers and masters of industrial training of educational institutions of primary and secondary vocational education;
  5) teachers of educational institutions of higher education;
  6) doctors and employees of medical organizations with higher medical (pharmaceutical) or other higher education, providing medical services (ensuring the provision of medical services);
  7) secondary medical (pharmaceutical) personnel (personnel providing conditions for the provision of medical services);
  8) junior medical personnel (personnel providing conditions for the provision of medical services);
  9) employees of cultural institutions;
 10) researchers;
 11) social workers;
 12) pedagogical workers of educational, medical organizations or organizations that provide social services to orphans and children left without parental care.
The calculation of the average wage of social workers and science by categories is carried out in the following cuts:

- in Russia, federal districts and subjects of the Russian Federation;
- by municipalities at the level of municipal districts and urban districts;
- by type of institution in accordance with the local lists provided for in the instructions for completing individual forms;
- by forms of ownership: state (including: federal, subjects of the Russian Federation) and municipal;
- by departmental affiliation.

Statistical observation of the distribution of the number of employees by the size of the accrued wages is carried out once every 2 years on a selective basis and covers the organization of all types of economic activity and forms of ownership (without small businesses). Until 2008, this survey was conducted annually in one of the months of the year (mainly April). The last survey was conducted in April 2017.

In April 2017, the survey covered 103,7 organizations (27%). The next survey will be conducted in April 2019.

When conducting the survey, the distribution according to the size of wages in the interval row is subject to employees who are members of the list of organizations and have worked all April working days in accordance with the accepted mode of work in organizations, including part-time workers. The employees who were accepted and retired in the reporting month are not included; having leaflets of temporary disability; those who were on maternity leave, parental leave; as well as external part-time workers and employees of the entry list.

Wages include all amounts accrued to employees in April in accordance with the payment documents for which employees were paid wages, both in monetary and non-monetary forms, for time worked and unworked time, compensation payments related to working conditions and the mode of operation, bonuses and surcharges, bonuses, as well as payment for food and accommodation, which is systematic. If an employee combines two positions (professions) in one organization, then the total amount of remuneration accrued for the main and combined position (profession) is included in the employee’s earnings.

When conducting a survey on the distribution of the number of employees by accrued wages, the following payments are not included in the wages of employees: remuneration for the year, long service paid once a year, one-time bonuses and incentives, including the cost of gifts, material assistance vacation, as well as other payments that are one-time nature. In case of quarterly payments of wages, one third of the amount accrued on the basis of the results of work for the first quarter is included.

Based on the results of the distribution of the number of employees according to the size of the accrued wages, information is generated on the distribution of the total amount of funds for the payment of workers by 10% (decile) groups of workers in a series of distribution, on the average wage of workers in decile groups, on the median wage.

Information on the distribution of the number of employees according to the size of the accrued wages is developed by type of economic activity, subjects of the Russian Federation, and forms of ownership (state, municipal, non-state).

Other generally accepted in statistical practice indicators of differentiation and concentration of wages, such as decile coefficient of differentiation, coefficient of funds, Gini coefficient, Lorenz curve, are also developed and published.

Discussion

Since 1994 selective statistical monitoring of the average wage of workers by profession and position is carried out. In 2004, the survey was transferred to a new methodological basis, which, along with the selection of organizations, provides for the selection of workers as well, with filling in for each worker who was selected for depersonalized information on the following
characteristics: gender; age; education; profession; position; work experience; actually worked time; the amount of salary accrued in October; wage structure. Since 2005, the survey has been carried out at intervals of 1 every 2 years for odd-numbered years.

The last survey was conducted in October 2017. The survey covered organizations (without small businesses and organizations with fewer than 15 people) of the following economic activities:
- agriculture, hunting and forestry;
- mining;
- manufacturing;
- production and distribution of electricity, gas and water;
- building;
- wholesale and retail trade, repair of motor vehicles, motorcycles, household goods and personal items;
- hotels and restaurants;
- transportation and communication;
- real estate transactions, rent and provision of services;
- education;
- healthcare and social services;
- activities for the organization of recreation and entertainment, culture and sports.

For the survey by occupational group, employees of the payroll were selected who worked full time (salary) all working days of October. The sample of workers amounted to 849 thousand people.

The classification of occupations and positions of workers in the sample was made using the All-Russian Classifier of Occupations of Workers, Employees and Tariff Scopes (OKPDTR) [13]. The formation of the survey results was carried out according to the classes in accordance with the All-Russian Classification of Occupations (OKZ), which is comparable to the International Standard Classification of Occupations ISCO-88. Starting with the results for October 2015, the formation of statistical information is carried out on the basis of the new OKZ OK 010-2014 [6], which is harmonized with ISCO-08 [4].

The wages of workers who worked at full time (salary) on all working days of October included the amounts accrued to employees in October in accordance with the payment documents for which wages, bonuses, etc. were calculated with employees for hours worked, compensation payments related to working conditions and work schedule, bonuses and allowances, etc. For employees who are registered in the same organization for more than one rate, the amount of wages included payments taking into account part-time jobs. With quarterly payments (in particular, bonuses), one third of the quarterly amount accrued on the results of the work for the quarter was included in wages.

The following payments were not included in the salary: remuneration according to the results of work for the year, for the length of service paid once a year; one-time bonuses and incentives, including the cost of gifts; financial assistance for the holidays, as well as other payments that are one-time in nature.

Information on the average wage of workers by profession and position is developed by type of economic activity, constituent entities of the Russian Federation, and forms of ownership (state, municipal, non-state).

Federal statistical monitoring of the number and remuneration of employees of state bodies and local governments by categories of personnel is conducted by Rosstat on a quarterly basis on the basis of the federal statistical monitoring form No. 1-T (GMS) «Information on the number and remuneration of employees of state bodies and local governments by staff category» [3].

The respondents that are subject to federal statistical monitoring are legal entities (and their separate subdivisions) – state bodies of the Russian Federation (federal, constituent entities of the Russian Federation) and local governments.
Observation is carried out on the basis of a continuous method. According to the results of the federal statistical observation, the following indicators are formed quarterly:

- the actual number of employees who replaced state posts and positions of state civil (municipal) service at the end of the reporting period;
- their average monthly salary;
- the staffing of these posts (the ratio of the actual number of employees to the number of posts by state).

Official statistical information about the number and remuneration of employees of state bodies and local governments by categories of personnel is developed for Russia, federal districts and subjects of the Russian Federation and is grouped by:

- branches of government (legislative, executive, judicial);
- levels of government (federal and regional);
- ministries and departments (federal state bodies, state bodies of the constituent entities of the Russian Federation);
- to local authorities.

Form No. 1-T (GMS) is filled in the following categories of personnel in accordance with the staffing table:

1) government posts of the Russian Federation, subjects of the Russian Federation, municipal posts;
2) positions of the state civil service;
3) positions of another type of federal state service;
4) other staff in the organization.

In the category “Public offices of the Russian Federation, constituent entities of the Russian Federation, municipal posts” are taken into account persons who have been replaced in accordance with the Decree of the President of the Russian Federation of January 11, 1995. No. 32 [7] public offices established by the Constitution of the Russian Federation, federal laws (federal government posts), constitutions, charters of constituent entities of the Russian Federation (government posts of constituent entities of the Russian Federation) for the direct exercise of powers of state bodies, municipal posts, in accordance with the lists of these posts, approved by the regulatory legal acts of the subject of the Russian Federation and the municipality. The category “Civil service positions” includes employees in accordance with Federal Law of July 27, 2004 No. 79-FL [1] and the Register of Positions of the Federal State Civil Service, approved by Decree of the President of the Russian Federation of December 31, 2005 No. 1574 [8] as well as registers (lists) of positions of the subjects of the Russian Federation, approved by the relevant regulatory legal acts of the subjects of the Russian Federation; the category “Posts of the municipal service” – in accordance with the Federal Law of March 2, 2007 No. 25-FL [2] and the registers of posts of the municipal service in the subjects of the Russian Federation, approved by the laws of the subjects of the Russian Federation.

In the category “Positions of another type of federal state service”, law enforcement officers are taken into account, as well as employees of the prosecution and investigation agencies (prosecutors and investigators), i.e. persons with special titles.

The category “Other personnel on the staff of the organization” includes employees who are not categorized by personnel (this is the so-called support staff).

**Conclusion**

The review presented above shows that the official statistical information on average wages developed by Rosstat is a fairly well-structured, multidimensional hierarchical system of statistical indicators, possessing (especially due to innovations of recent years) significant analytical potential for a comprehensive study of this major labor market indicator.
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REFERENCE TO ARTICLE

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Comparative Analysis of Enterprise’s Participation in the Process of Labor Training in USA, Great Britain and Russia

Annotation: solving the problem of providing Russian enterprises with high-quality workforce with the necessary professional competencies from the point of view of the theory of human capital and the Soviet and foreign experience is impossible without involving the companies themselves in the process of preparing the workforce. Studying the experience of the United States and the Great Britain allowed to identify that for several decades they took various measures to involve employers in the educational process and were able to develop appropriate legal, financial, and institutional mechanisms. Benchmarking of national and foreign practice revealed the weak points of the first and allowed to develop improving changes, such as – implementation of targeted state policies to develop the institute of training in the workplace, allocation of funds in the state budget in the form of subsidies for enterprises participating in the apprenticeship program, increasing the flexibility of educational programs through the introduction of cooperative forms of education, expansion of powers of public organizations in decision-making and implementation of educational policy and other methods.

Key words: vocational education and training, apprenticeship, enterprise, qualification, on-the-job training.

JEL classification: A100, A110, A130.

Introduction

For Russian enterprises, the problem of the lack of qualified specialists according to surveys of the Russian Union of Industrialists and Entrepreneurs has been among the top three most significant constraints on the growth since at least 2007 [12]. Improving the quality of labor training and the formation of professional competencies is a complex multicomponent problem. Moreover, it involves stakeholders from various public subsystems – the education system, the labor market, the state and enterprises. It is a serious constraint for the implementation of current and ongoing plans for the development of the economy and the creation of a competitive business.

Both the tenets of the theory of human capital [4] and various applied studies of vocational education systems indicate the need to involve employers in educational processes at different stages and in various forms. This problem is relevant not only for Russia. Except Germany and Switzerland, all other developed countries are in constant search for tools of it’s solution. Studying the experience of these countries, namely the legislative, institutional and economic aspects of the formed training systems for workers and specialists is important both from the
point of view of finding the best practices for their further implementation in the Russian context, and for a general understanding of the processes taking place abroad.

Methods

An analysis of vocational education and training systems (VET) within each country was carried out, namely, the main components were identified, the analysis of normative acts regulating the behavior of the system was carried out, the system management structures and main institutions were identified, and quantitative indicators were analyzed. A structural problem analysis scheme was proposed (ad-hoc methodology), which adapts the basic system analysis methodology to the problem of staffing enterprises. Next, an analysis of labor market institutions was carried out: regulation, mechanisms for the formation of wages, features of labor legislation, the role of employer’s associations.

At the final stage of the study, the method of comparative analysis was applied. The main differences and similar components and structures within the studied systems were identified. Of a particular importance is the identification of those structural elements that contribute to the successful participation of business in the preparation and formation of professional competencies in foreign countries, and the development on their basis of proposals for implementation in the Russian Federation.

Results

Case of the USA

Career and Technical Education (CTE) training system students in the USA have an opportunity to gain work experience in the learning process in the following forms:
- Job Shadowing;
- Community service;
- Cooperative education;
- Internship;
- Mentoring;
- Apprenticeship;
- School based enterprise.

The closest to the practice-oriented forms of public-private partnership (PPP) training in the workplace are apprenticeship programs, work experience and training within the enterprise educational organization. Apprenticeship as an institution was introduced into USA legislation in 1937, the Senate passed the National Apprenticeship Act or the Fitzgerald Act that is included in Chapter 29, Section 30 of the Federal Management Code (U.S. Code of Federal Regulations) [17].

The law establishes that apprenticeship programs must meet certain criteria and must be registered with enterprises in the Office of Apprenticeship (OA) at the US Department of Labor (DOL). The apprenticeship program itself involves a combination of on-the-job training, theoretical training, subject to the payment of wages to the student, programs can be launched by an enterprise, a group of enterprises, professional unions, educational organizations. implements apprenticeship programs (sponsor), develops training programs, provides students with a job and pays for their work, conducts training and instruction, and monitors the results achieved. The organization itself decides to open programs or not. As a rule, this form of training is implemented jointly with local organizations, schools and colleges, employment services, etc.

Program’s participating students can be registered with an employer at the US Department of Labor or at the State Apprenticeship Agency. For this, the program must meet criteria such as the availability of equipment, the availability of opportunities for training, student pay, the duration of at least 2000 class hours, etc. The duration of the program depends on the specialization and ranges from 1 year to 6 years, but on average it is 4 years. As a rule, all expenses for the program are borne by the employer, including the costs of theoretical training. The average earnings of a novice apprentice is 50–60% of the possible salary. Upon completion
of the theoretical and practical training, graduates receive a qualification certificate recognized throughout the country.

In total, as of 2018, there were 23 thousand apprenticeship programs, 585 thousand students were trained in them all over the country. Table 1 presents data on the apprenticeship programs in the dynamics for 2010–2018.

Despite significant indicators in absolute values, in relation to the total number of students, the share of students in the workplace is insignificant [16, p. 721]. This is recognized by American experts, as well as the fact that for more than 80 years of history of using this tool, its scope has remained limited. For a very long time, the institute of apprenticeship was distributed exclusively in the manufacturing and construction spheres. For small and medium businesses, the costs associated with organizing on-the-job training often seem insurmountable. Nevertheless, on-the-job training is considered as the most important tool for solving problems of shortage of qualified personnel [20, p. 2–3].

Table 1

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Active Apprentices</th>
<th>New Apprentices</th>
<th>Total Completers</th>
<th>Active Programs</th>
<th>New Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>387 720</td>
<td>109 989</td>
<td>51 212</td>
<td>25 961</td>
<td>1807</td>
</tr>
<tr>
<td>2011</td>
<td>357 692</td>
<td>130 391</td>
<td>55 178</td>
<td>24 967</td>
<td>1409</td>
</tr>
<tr>
<td>2012</td>
<td>362 123</td>
<td>147 487</td>
<td>59 783</td>
<td>21 279</td>
<td>1750</td>
</tr>
<tr>
<td>2013</td>
<td>375 425</td>
<td>164 746</td>
<td>52 542</td>
<td>19 431</td>
<td>1540</td>
</tr>
<tr>
<td>2014</td>
<td>410 375</td>
<td>170 544</td>
<td>44 417</td>
<td>19 260</td>
<td>1623</td>
</tr>
<tr>
<td>2015</td>
<td>447 929</td>
<td>197 535</td>
<td>52 717</td>
<td>20 910</td>
<td>1898</td>
</tr>
<tr>
<td>2016</td>
<td>505 371</td>
<td>206 020</td>
<td>49 354</td>
<td>21 339</td>
<td>1701</td>
</tr>
<tr>
<td>2017</td>
<td>533 607</td>
<td>191 563</td>
<td>64 021</td>
<td>22 488</td>
<td>2369</td>
</tr>
<tr>
<td>2018</td>
<td>585 026</td>
<td>238 549</td>
<td>71 789</td>
<td>23 441</td>
<td>3229</td>
</tr>
</tbody>
</table>


Educational policies are administered by individual states, and the latter take steps to encourage on-the-job training. These measures can be classified as follows [20, p. 4]:

– expansion of apprenticeship – involvement of enterprises and their associations, educational organizations and students (students, unemployed) from various industries within the state [20, p. 4] to the implementation of programs;

– allocation of subsidies – an example would be Arkansas, where organizations are given a deduction of $ 2,000 for each student [20, p. 10]. A total of 18 states as of 2017 had such kind of financial incentive programs [20, p. 5];

– development of apprenticeship programs for youth (youth apprenticeship), as well as pre-apprenticeship training programs that are aimed at attracting students of the system of secondary vocational education at the age of 16–18 years.

On-the-job training programs are often not dependent on the VET system. In its report, the US Department of Education notes [11, c. VIII] that in practice, educational programs in the system of vocational education and training programs for young people in the workplace can be correlated as follows:

– programs are fully coordinated;
– the apprenticeship program is integrated into the open source vocational education program and on-the-job training is counted when recruiting points (credits);
– the apprenticeship program is parallel to the educational program, theoretical training is implemented either in college or in a private educational center.
The case of the UK

The UK has constantly thought to increase the participation of young people in VET programs and to attract employers to solve this problem. In the 1960s tax preferences for business were introduced. The state took a significant part of the financing of the apprenticeship programs on itself, in parallel trying to pass some of the costs on the students, but this did not work [19, p. 41–43].

The UK government is currently actively pursuing a policy of expanding the participation of employers in PPP and training in the workplace, taking into account the accumulated not always positive experience. The central element of this training is the apprenticeship institute introduced in 2009 by the Apprenticeships, Children’s Skills, Children and Learning Act and significantly expanded by the Enterprises Act 2016.

Part I of the 2009 Law on Apprenticeship, Skills, and Children’s Education [9] establishes a central coordinating body, the Institute of Apprenticeship (IfA). The main task of the IfA is to determine the areas of activity, training in which is possible and appropriate in the form of on-the-job training and coordinate the development of apprenticeship standards. These standards describe the scope of activities, set the input requirements, competencies that the student must master, the duration of training. The development of standards is carried out by representatives of enterprises. The responsibilities of the IfA include a description of the procedure for evaluating the results of training, the form of the examinations. Each standard contains an indication of the qualification level that the student receives at the end.

Apprenticeship programs themselves involve practical training for the employer for four days a week. One day, as a rule, is reserved for theoretical training, since by law it should not be less than 20% of the total time. During training, students receive a salary and paid holiday of 20 days. Payment is not less than 3.7 pounds per hour, which is the minimum wage in the country, but on average this value is 6.7 pounds (or 14,000 pounds per year) [1]. The duration of apprenticeship programs range from one to five years. There are four levels of apprenticeship, presented in table 2.

### Levels of apprenticeship in England

<table>
<thead>
<tr>
<th>Name</th>
<th>Level</th>
<th>Equivalent educational level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intermediate</td>
<td>2</td>
<td>General certificate of Secondary education</td>
</tr>
<tr>
<td>Advanced</td>
<td>3</td>
<td>A level</td>
</tr>
<tr>
<td>Higher</td>
<td>4, 5, 6 &amp; 7</td>
<td>Foundation degree and above</td>
</tr>
<tr>
<td>Degree</td>
<td>6 &amp; 7</td>
<td>Bachelor’s or master’s degree</td>
</tr>
</tbody>
</table>


As can be seen from table 2, apprenticeship programs are not limited to the usual level of VET, but can be applied in higher education in those professions and specialties that require high qualifications. The Department of Education website provides a list of occupations that can be mastered through on-the-job training. For example, obtaining the profession of a baker, a hairdresser or a furniture manufacturer means the achievement of a level 2–3 qualification. But there is also the possibility of training for an aerospace engineer, a specialist in the nuclear industry under an apprenticeship program, and this is already the 6th level of qualification.

In order to open an apprenticeship program, an employer must refer to the register of apprenticeship standards and select the appropriate one. After that, he needs to find an organization that will provide technical training (training provider). In general it is a technical college. The register of such organizations is maintained by the General Education and Vocational Education Fund (ESFA). The college conducts theoretical training,
together with the employer draws up a curriculum, monitors the progress of the student. The college also selects students for the employer. After that, a tripartite apprenticeship agreement is signed between the employer, the college and the student.

At the same time, the enterprise itself can either provide the student seat itself, or negotiate with other enterprises (subcontractors) and participate in the program jointly. The same is the case with a vocational college or a higher education organization – they may involve other organizations in the provision of theoretical training. Figure 2 shows schematically the participants in the apprenticeship programs.

**Figure 1. Participants of apprenticeship programs in England**

*Source: developed by the author.*

British law provides for the payment of subsidies to the enterprise for each training place. State funds can be used exclusively to pay for theoretical training of students and the cost of an independent assessment of the qualifications they receive. This fee for companies was introduced in order to equalize the financial conditions of companies that train and who do not train apprentices and overcome the problem of “poaching” employees.

Assessment of the results of the student's learning of theoretical knowledge and practical skills is made by an independent organization (End-point Assessment Organization). The register of these organizations is maintained by the Fund for Funding General and Vocational Education. Employers are free to choose the one they want for the final assessment of apprentices.

On-the-job training programs are becoming increasingly popular due to the measures taken by the Government. In the 2012/2013 school year, 868 thousand students studied in England, 36 thousand in Scotland, 47 thousand in Wales. In the 2016/2017 academic year in England, already 908.7 thousand people studied on apprenticeship programs [7, p.1]. For comparison, the total in the system of secondary vocational education (at the expense of the state budget) in the same year, 2,237 thousand people over the age of 19 studied. Since 2010, a total of 3,497 thousand students have passed through the apprenticeship program [7, p. 13].

**The case of the Russian Federation**

After the decay of the USSR, the institutional environment within which existed institutions of interaction between industry and the VET has collapsed. Enterprises left the system of personnel training, which negatively affected the quality of graduates of the system of secondary vocational education. The institute of the formation of wages led to the formation of significant differences in the remuneration of workers of the same qualification in different industries and within the same industry, which aggravates the problem of enticing personnel [18].

Nevertheless, within the framework of such an institutional environment, unfavorable to the participation of enterprises in the training of workers, during the 1990s and 2000s a certain
experience of partnerships between colleges and enterprises was accumulated, denoted by the general term “social partnership” [15, p. 268–288]. The main forms of social partnership practiced by enterprises and VET in Russia are as follows [14; 5]: the provision and organization of places by the enterprise for internship; assistance of employers in the employment of students and graduates; development of educational programs in conjunction with the employer; involvement of specialists (business/employer representatives) in teaching an educational organization; holding events together with the employer – contests, competitions; the transfer by the employer of property (equipment), the modernization of educational laboratories, classrooms, workshops; other.

The studies carried out by the Higher School of Economics within the program “Monitoring the economy of education” [5; 6] based on a survey of employers provide similar results. As a part of the sample (511 enterprises from industry, transport and construction), a survey of managers was conducted and it was found that 50% of the surveyed companies interact with VET [5, p. 23]. The most popular forms include the provision of internships and internships (40% of respondents) and participation in open days and job fairs. The remaining forms of cooperation given above were used by less than 7% of the respondents. According to survey results, only 36% of surveyed enterprises were going to develop interaction with VET. As can be seen from the above data, social partnership is not a widespread phenomenon and is limited to several forms.

To solve the problem of the low quality of training and lack of professional qualification of workers and mid-level specialists, enterprises began to develop corporate education [9]. Sometimes companies develop not only the structural units engaged in training, but also create separate corporate universities. Among the companies that have such corporate universities are MGTS, Severstal OJSC, Rosatom, Gazprom, Russian Railways, Rostelecom OJSC, Lukoil. Along with the training of management personnel, corporate education is also aimed at improving the skills of ordinary workers. There are examples of cooperation between enterprises, for example, companies that were part of RAO UES of Russia OJSC, with educational organizations of higher education and with VET, when they invite senior students for contractual training and practice at corporate universities [9, p. 119].

In the Russian Federation, since the collapse of the USSR, experience has been gained in the interaction of enterprises with VET system training of future workers and middle managers. These are various forms of social partnership, participation of enterprises in professional skill contests and independent assessment of qualifications. In the regulatory legal framework, such institutions as the network form of the implementation of educational programs, “basic departments”, and professional qualification centers have been introduced. There are so-called “best practices” of joint training, but in general they remain isolated examples and the main part of enterprises and VET are not connected with each other, that is also reflected in disproportions in the structure of personnel training and the quality of their competencies.

Discussion

As a result of the analysis of training systems for qualified workers and specialists, the following points were identified:

– in all studied countries, the introduction of on-the-job training systems (apprenticeship programs) is recognized as the foremost direction in the development of a VET system. The United Kingdom and the United States have developed and are pursuing a targeted, long-term policy at the state level to involve employers in educational processes;

– in all the countries studied, the on-the-job training system is connected with the formal education system, but is not identical to it. Admission to apprenticeship programs is open to students of the VET system, graduates of the VET system and higher education, as well as the unemployed;

– in order to attract enterprises for on-the-job training in the conditions of competition in the labor market, the state assumes a significant part of the costs;
the system of independent assessment of qualifications plays a strategic role in all countries;
– in all studied countries, the concept of apprenticeship (apprenticeship) as a special form of training specialists has already been introduced into legislation;
– the US and UK experience shows a trend in the increasing flexibility of educational programs. The boundaries between the levels of school, secondary vocational and higher education are becoming more blurred;
– to assess the effectiveness of the ongoing policy of developing training in the workplace and the effectiveness of expenditure of funds the US introduced in the legislation mechanisms for the scientific support of educational policy.

The table 3 provides an expert comparison of the measures taken by foreign countries and Russia to attract enterprises to the training of workers and specialists.

<table>
<thead>
<tr>
<th>Instruments</th>
<th>USA</th>
<th>UK</th>
<th>Russia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apprenticeship policy is implemented on the state level</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>The term “Apprenticeship” is introduced in the legislation</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>The state participates in the process of co-financing the on-job training programs</td>
<td>+/−</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>National qualification system is being introduced (including independent qualification assessment)</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>The ministry of Labor is in charge of introduction of apprenticeship programs</td>
<td>+</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>There is a possibility to implement educational programs in the network form</td>
<td>+</td>
<td>+</td>
<td>+/-</td>
</tr>
<tr>
<td>Scientific maintenance and independent assessment of projects realized is applied</td>
<td>+</td>
<td>+</td>
<td>+/-</td>
</tr>
</tbody>
</table>

Source: developed by the author.

Conclusion

Summing up the study, it is necessary to point out the main proposals for improving the Russian system of personnel training based on the experience studied:
– implementation of targeted state policies to development of the institute of training in the workplace;
– the allocation of funds in the state budget in the form of subsidies for enterprises participating in the apprenticeship program (including through targeted programs);
– introduction into the legislation on education and labor of the concept of “on-the-job training”;
– expansion of the scope of application of the system of independent assessment of qualifications, including into the VET;
– increasing the flexibility of educational programs through the introduction of cooperative forms of education, the expansion of activities on vocational guidance in school;
– creating preferential conditions for students in deficient professions and specialties, including exemption in the army service;
– expansion of powers of public organizations (associations of employers, representatives of the education system) in decision-making and implementation of educational policy;
– scientific support and evaluation of ongoing programs in the field of education.

References


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Transformation of Education in the Digital Economy

Annotation: the article reviews the performance of leading scientists at the e-Learning summit 2018, Moscow eSTARS, 5–6 December 2018. The necessity of providing online educational programs is substantiated. Educational information resource: virtual educational environments, COURSERA information platform, educational portals, online training in social networks are considered. Describes how to use the chat-bots and neural bots in the provision of personalized information for students. Digital technologies in education are reviewed. The digital transformation of education in the era of Digital economy is substantiated. It is recommended to review the speeches of foreign and domestic scientists at the e-Learning summit 2018.

Key words: education transformation, online learning, Digital economy, digital technologies, e-Learning summit 2018.

JEL classification: A100, A110, A130.

Introduction

The transformation of higher education was discussed at the e-Learning summit 2018, Moscow eSTARS, 5–6 December 2018. The main purpose of the transformation of higher education in the era of Digital economy is to develop high-quality electronic content of online courses and transfer to online training of students of higher education institutions and all citizens in need of education.

The use of digital technologies for the placement of electronic educational resources will bring the educational process to a new higher level. Digital technologies in the educational process unite students, universities, States, technology companies. The process is carried out in such a way that in the process of collaboration relationships become transparent, access to educational resources is limitless in time and space.

Digital technologies in education help to unite citizens of different countries of the world. Digital transformation of education is aimed at using any kind of information in educational content: from multimedia educational information to 3D-virtual augmented reality. General
principles of Digitalization are determined by the latest requirements of the RF Government Resolutions on “Digital economy of the RF” (RF Government Decree of August 28, 2017 No. 1030 “On the system of management of the program” Digital economy of the Russian Federation”.

Methods

The practical methods of research include: comparison, observation, measurement, description, experiment, modeling, questioning, survey, testing, interviewing. When writing this study, the following methods were used: measurement, description, modeling. At the e-Learning 2018 summit, representatives of educational institutions from countries such as Russia, the USA, the UK, China, Italy, France, Switzerland, Croatia, South Africa spoke. The main emphasis in their speeches the speakers did on the number of students on online courses students from different countries of the world. Summing up the number of trainees in the present, it was predicted that in the next 5 years the number of trainees online will reach 200 million people”.

Global information platforms, such as COURSERA, cover all popular educational areas, constantly monitor the creation and development of educational resources for the specialties of the future. Specialists of the future will be significantly different from modern specialists, because in the era of Digital economy will require specialists with new competencies corresponding to the specialties of the future. Specialists of the future, in all areas, will have interdisciplinary competence.

The transformation of society leads to the fact that students of medical institutions must possess the competencies of information technology, robotics and automation control. Educational resources are becoming more personalized. This approach of personification is aimed at reducing the time of the student and providing specific training information, with detailed information on the chosen direction. This approach of personification in education significantly reduces the time, financial, labor and material resources of the student.

In the era of Digital transformation of society, educational content contains all kinds and formats of information, namely: text, sound, video, multimedia, vector and raster graphics, multi-time composites, virtual and augmented reality, and more. Gradually there is a replacement of traditional forms of education, other more modern forms that meet the requirements of the modern world, the requirements of the modern pace of life, the requirements of modern presentation of information and documentation. No one denies the necessity of using in the educational institutions of the old classic ways of teaching, but the need for the use of online learning is the necessity that is dictated by the onset of the era of the Digital transformation of companies. Most of the universities in European countries are aimed at scaling up online education.

Scaling processes lead to cheaper online courses, although this is not the main task of foreign educational institutions. New methods of knowledge assessment are used. New methods of mastering complex disciplines are proposed. Assessment of student knowledge is automated. Education is gradually moving to social networks. It is necessary to remember that a small percentage of students are people with disabilities. In e-learning, people with disabilities need specialized educational content.

Use in systems of electronic document management of remote work, allows to provide people with disabilities with work. The presence of electronic signatures allows people, including those with disabilities to work in the system of electronic interaction in the legal field, because the electronic signature is legally significant and work with electronic documents has legal force, both on the part of the employee and the employer (organization). Advanced organizations are trying to create their own educational resources. Universities and organizations are joining forces [9]. By analyzing the digital traces of search queries, targeted sent offers on educational courses. Chat-bots that analyze user requests are connected to the education system. Personal delivery of links to users of educational resources ensures the competitiveness of educational institutions. The prospect of the future is the use of Nate bots, which detail the delivery
Digital technologies in the educational process unite students, universities, States, technology companies in such a way that in the process of collaboration the relationship becomes transparent, access to educational resources is limitless in time and space, can unite citizens of different countries of the world and promote information communication. Statistics show that almost all higher education institutions use blended learning in the learning process (classical + online).

An individual feature of educational institutions is the use of gamification in the learning and training processes. Game methods stimulate the educational process. The most popular courses with elements of gamification are courses for preschool and school forms of education, as well as for 50+pensioners. Gamification is used in staff training and retraining. Staffing of high-tech companies leaves much to be desired. Such companies are aimed at the preservation of personnel, provide them with further retraining under the requirements of the Digital economy. Gamification does not guarantee quality education, it is an additional tool in the educational process. In the training of military technical staff used the technology learning equipment. Training on simulators provides immersion in virtual and augmented reality.

Summing up, it should be noted that the Digital transformation of education is a necessary element of the competitiveness of higher education institutions. An additional advantage is the involvement of different segments of the population in the educational process [16].

Online education is both paid and free. The breadth of involvement in online education is children from 5 years, pension and retirement age, retraining for the age of 50+. Various segments of the population, people with disabilities, especially with limited movement (bedridden patients), pregnant women on maternity leave, low-income people, regionally remote citizens, almost all have the opportunity of continuous learning through virtual educational environments of higher education institutions, through portals of educational services, even in social networks, on Facebook, etc. learning opportunities are provided, including professional training, distance learning, e-learning with the use of electronic content for distance learning regional units of state educational institutions of higher education, etc.

All countries of the world have switched to e-learning. At the e-Learning 2018 summit, the heads of the world’s leading universities shared their projects for the future [5; 15]. Digital transformation of education is a necessary direction of development in the era of Digital economy. The speeches of foreign colleagues can be found on the website [12].

The main directions of the conference e-Leaning summit 2018 – Definition of the strategy and prospects of digitalization of education: 1) discussion of the main trends and state policy in the field of digitalization of education; challenges of the market and the position of business as a potential employer; 2) the world’s leading researchers and organizers of online training, representatives from the field of education, business and technology; 3) unique research of online education. Ideas and new solutions obtained at the interface of interaction between scientists and practitioners; 4) productive networking, workshops, workshops; the opportunity to meet and exchange experience with the leaders of the online education market.

The most interesting speeches of foreign scientists, which can be said on the website [4]: Neil Morris Professor, Director of digital learning, University of Leeds; Ting Chuan Pong Professor, senior Advisor to the rector, Director of the center for innovation in technical education and Professor of computer science and engineering, Hong Kong University of science and technology and others. The most interesting performances of domestic scientists, which can be said on the website [4]: Yaroslav Kuzminov, rector of HSE; Vasily Tretyakov, General Director, University 20.35. In order to keep abreast of developments in the field of Digitalization of education, it is advisable to get acquainted with the directions of development of various higher educational institutions of foreign countries. The eSTARS 2018 summit was attended by over 500 people.
from 16 countries of the world, including the United States, Great Britain, China, Italy, France, Switzerland, Croatia, and the Republic of South Africa. More than 100 speakers, as well as rectors and heads of 58 Russian universities took part in the 21 sections of the conference. The speakers identified the need to expand the availability of online courses. Modern education is shifting: from the classical to the traditional in the direction of an individual personified. Online training of the student is served on his individual track (track). The system shows what course a student has studied for a time. It is determined: what tasks he could not fulfill, what disciplines are given by students more easily. The student’s digital footprint is material for additional analysis of his academic performance. Gradually, information on student competencies is growing. In systems of distance online learning, you can select the best students, thereby forming human capital. The President of the UNICA University Association, Luciano Saso, brought up the summit participants for discussion on the need to create strategic educational alliances. Practice-oriented direction is considered blended learning. Corporate training experts (ONEKO, Rostelecom, Voxy, Nodus, Netology-groups) presented their experience in using blended learning technologies for the effective development of companies. The use of gamification in learning processes is one of the modern technologies in training and retraining of personnel of companies and corporations. The trends of gamification, the use of VR / AR and simulators in education were discussed by experts from HSE, TSU, 20.35 University, Modum Lab, MOST Creative Camp and Coursera online platform. The speakers conducted a survey following the discussion and came to the conclusion that gaming methods and simulations increase the involvement in the learning process and provide instant feedback, which is extremely important in the context of online learning [4]. Representatives of leading universities and the global online platform Coursera spoke at the plenary meeting of the eSTARS 2018 Summit on the features of education in demand in the digital economy, and discussed issues related to the impact of technology development on the global educational market. Speakers: Shravan Goli (Coursera Development Director), Yaroslav Kuzminov (Rector of HSE), Neil Morris (Professor, Director of Digital Learning at the University of Leeds) and Luciano Saso (President of UNICA and Chairman of the EduLAB Working Group). One of the recognized universities for online learning is recognized by Leeds University or the University of Leeds (Eng. University of Leeds) – one of the largest universities in the UK, with about 7,500 permanent employees and 32 thousand full-time students. It is among the top ten British universities, both in terms of research and in the number of students. Also included in the group of “red brick universities” and the Russell group. The campus of the university is located directly next to the center of Leeds. Currently, Leeds University is one of the best educational institutions in the UK, leading in areas such as electronics, food production, urban planning and transport, chemistry of dyes, teaching English and foreign languages. Tagged advertising of educational courses of the University of Leeds when placed on Internet resources is confirmed by the emblem (fig. 1).

Figure 1. Leeds, West Yorkshire. University of Leeds, Leeds, LS2 9JT, UK
At the summit, the representative of the EU Directorate for Education, Youth, Sports and Tourism Francesca Maltauro expressed the proposal “They (university alliances) should emerge due to the combined efforts of already existing universities (for each “European university” participation of at least three EU countries is necessary) and to have inter-university campuses. In the European Union, they believe that such alliances will help increase the competitiveness of European education and, as a result, the economy. The EU also supports projects on the digitization of management processes in the field of education, in particular, to simplify academic mobility processes within Europe. The first “European universities” should appear at the end of 2019 “Speech [4].

1. UNICA – a network of universities from the capitals of Europe – was founded in 1990 and currently includes 49 universities from 37 European capitals, bringing together more than 160,000 university staff and 1,900,000 students. The UNICA General Secretariat is located in Brussels, Belgium. Currently, the president of the UNICA network is Professor Luciano Saso, Vice-Rector for European University Networks (Sapienza University in Rome). UNICA seeks to promote international cooperation and promote academic leadership through mutual understanding and exchange of experience between its members in the European Higher Education Area. It also provides a forum in which members can reflect on the needs of strategic change in university research, education, administration, and community involvement. The activities of the Network are guided by the principles set forth in its Mission and Vision. UNICA provides a forum for its members to discuss the latest developments and requirements for strategic changes in university research, education, and administration. To achieve its goals, UNICA carries out member-oriented activities, the content, format and frequency of which largely depend on the participation and interest of UNIC member universities. UNICA is also actively involved in European projects, both as a coordinator and as a partner.

2. EduLAB. From 2002 to 2013, UNICA organized the Bologna laboratories – annual meetings for the Bologna coordinators, where problems and best practices related to the implementation of the Bologna process were discussed. Ten years after the founding of the UNICA Laboratory Coordinator Group in Bologna, the Group looked beyond the Bologna Process to change its activities in the light of the changing European landscape of higher education. The modernized UNICA EduLAB now directs its discussions on the importance of the Bologna process for European universities and focuses on new concepts and recent advances in teaching and university studies, including student-oriented learning, recognition of excellent teaching, new technologies of teaching and learning environments.

Results
The results of the presentations can be useful for: representatives of the legislative and Executive authorities; Heads of universities and educational organizations, Researchers of online education and educational technologies; Heads of educational online projects; Heads of corporate universities; distance education Professionals.

The digital transformation of society was discussed by domestic and foreign scientists. The speeches of his colleagues at the summit the e-Learning 2018 are of practical importance. In the collective works of masters and bachelors conducted research on the following topics.

1. The strategic objective of education in modern economic conditions.
2. Virtual learning environment as a tool to improve the quality of education.
3. An overview of the advantages of a virtual educational environment on the example of the Russian State Social University.
4. Student in e-Learning environment.
5. Modern technologies of teaching in the education system.
7. Electronic signature in the process of interaction with remote workers.

The above works can be found at the link [12].
Discussion

In conclusion, it should be noted that the entire digital transformation of education has an economic aspect. In the works of Veretekhina S.V., Mnatsakanyan O.L. “...the use of virtual educational environments is given on the example of the Russian state social University, Moscow”. Scientific researches were carried out Kirillov A.V. “Content Development e-learning course on the academic discipline of higher education”, “Modern problems of personnel management, cost-benefit analysis of the systems and technologies of personnel management”, a research report [2].

This publication is dedicated to the memory of repairs Pochinok A.P., outstanding scientist, scientist and educator [9; 10].

Conclusion

In conclusion, it should be noted that the Ministry of education of Russia has developed the Order of the Ministry of education of Russia of 23.08.2017 No. 816 “On approval of the Application of organizations engaged in educational activities, e-learning, distance learning technologies in the implementation of educational programs”. The main requirement for higher education institutions is the need to implement educational programs, with the use of e-learning, distance learning technologies, organizing training sessions in the form of online courses that provide students with the achievement and evaluation of learning outcomes. The document says that educational organizations independently determine the procedure for providing educational and methodical assistance to students, including in the form of individual consultations provided remotely using information and telecommunication technologies. At implementation of educational programs or their parts with application of exclusively electronic training, distance educational technologies the educational organization independently and (or) with use of resources of other organizations:

- creates conditions for the functioning of the electronic information and educational environment, ensuring the development of students’ educational programs or parts of them in full, regardless of the location of students;
- provides identification of the personality of the student, the choice of the method which is carried out by the organization independently, and control of observance of conditions of carrying out actions within which the assessment of results of training is carried out.

Adaptation. The profession of a teacher or manager of an educational project will not disappear in the near future. According to a study by scientists from Oxford Karl Frey and Michael Osborne, the deaths of robotization are not threatened by the professions of a teacher, coach or manager in education. However, the digitization of education has not been canceled by anyone, and it will have to adapt to it, mastering new tools and acquiring new skills.

In the student’s personal account, the teacher lays out teaching aids and a list of recommended literature. As you study the discipline, the student takes tests and exams, which take place in the form of tests, writes term paper. Distance learning is carried out using the portal of the university. When enrolling a student, they are given a login and password for access to educational and methodological materials of the course: texts of textbooks, tasks for independent and control works, recommendations for their implementation, a schedule for studying the material, etc. Teachers, methodologists and technical support specialists via telephone or video communication, as well as e-mail and communication at the university forum give students regular consultations on issues that have arisen during the educational process.

According to Synergy University, in a couple of years, new professions will be in demand on the market, such as the developer of educational trajectories, a tutor or a virtual reality architect.

Adapting to the new digital reality in education, you will be forced to solve a number of problems. Your employees, most likely, will not want to leave the comfort zone and master new technologies or systems. Your task is to convince them of the benefits of innovation and motivate them in the same way as you motivate your students.
With the help of DLS, a teacher or a training specialist can:
• organize distance learning in a university or company «from scratch»;
• automate the already built learning process;
• create a unified database of all students;
• allow students to learn on their own, whenever and wherever;
• reduce administrative costs;
• introduce blended learning;
• test employees and students;
• to train a large number of people at the same time;
• issue certificates of attendance.

With the advent of new technologies in education, you will have to not only retrain old employees, but also recruit new ones. It is predictable that you will encounter a shortage of personnel – especially a shortage of intelligent, talented people, since only a few will learn new “digital” specialties in education.

• discard the paper in the document;
• all can be automated to remove routine tasks from employees;
• focusing on mobile platforms;
• take advantage of cloud technologies (this is the basis of the digital revolution in the organization).

With the advent of new technologies in education, you will have to retrain new employees. It is predicted that there will be a lot of people, especially since it will be new. It is not only people, but also already implemented systems. Digital transformation is a revolution. Its ideologue should be your project manager. You have to master dozens of new technologies over the past five years.

Distance learning along with correspondence is becoming an increasingly popular form of education. Applicants give preference to educational institutions that have DLS, which allows universities to increase the number of students enrolled on a commercial basis.

The development of a distance education system at the university corresponds to the objectives of the National Doctrine of Education and today is an absolutely legitimate process. The state not only allows, but also encourages the introduction of DLS in Russian universities.

It all started with writing on the walls and who knows how many years it will take before the distance learning systems replace conventional forms (daytime or absentee)? One thing is clear – progress, sooner or later, changes the world around us for the convenience of man for the better!

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Creating Learning Internet Portal

Introduction
Teaching children to play with computer technology is an effective way to learn. The use of computer games allows you to increase the motivation of students to study.

The development of computer games requires the knowledge of many specialized software tools and experience in this area. Currently, there are many companies involved in the development of educational computer games, for example, 1C, Magnatmedia, Information Technologies – Developing Games, etc [18]. As a rule, models of the computer world of the
game are very complex. The process of developing computer games itself is very complicated and quite often several thousand people take part in the development of games. Therefore, the development of models and algorithms, as well as the educational games themselves and their introduction into the educational process is an important task.

In the era of the development of a comprehensive Internet, the most modern game form of education is Internet portals. In the present work, an attempt is made to implement such a portal and to introduce it into the practice of a private educational institution of additional educational services “Consultant” (PEI “Pre-Educational Institution” Consultant), aimed at students and teachers of this educational institution.

**Methodology**

The purpose of this work is to develop a learning application implemented as a separate component of an entertainment web portal.

The object of the research is the web-platform of the online gaming portal.

The subject of the research is the development of an online portal using the most popular site management systems (CMS), various server platforms and development tools of the training application (framework, language and programming environment).

Based on the purpose and subject of the study, the following research objectives were identified:

- To get acquainted with modern technologies of designing applications and sites for designing the developed application and site, as well as defining their structures.
- Familiarize yourself with technologies for developing applications in a specific programming language or framework, as well as with CMS for developing an online portal.
- Highlight the requirements for online entertainment portals.
- Develop a draft application logic.
- Develop an online portal to meet the requirements for the development of an online entertainment portal. Develop an entertaining learning application.
- Publish online portal with the application on the server.
- Theoretical-methodological basis of the research are.
- Online resources for the development of an online entertainment portal.
- Online resources for developing applications using frameworks.
- To solve the set tasks, the following research methods were chosen.
- Theoretical: study, analysis and systematization of special literature on the problem of research.
- Practical: developing the structure of an online entertainment portal, publishing a website on the World Wide Web, registering with search engines, developing an educational educational application for students and linking it to the website as an online application.

**Discussion**

There are many programming languages, many of them have already been recognized as biased (dead) and uncompetitive with other more advanced and convenient alternatives.

In this paper we consider the features of some programming languages, their integration environment, as well as frameworks for creating projects [19].

- **C ++ Features (CPlusPlus)**
  - The language was born in 1980 and the creator of the language was Bjorn Strastrup, or rather, he added the language C.
  - In 1989, version 2.0 was released with many new, at that time, features: abstract classes, multiple inheritance, and so on.
  - In the future, there were improvements in the language and at the moment many groups are improving it, because now nobody has rights to it and it is free.
  - It is widely used by everyone in the world for developing applications and is the most popular programming language, it is possible to create an OS, drivers, various application
programs and games. This language is implemented in a variety of integration environments, for example, Visual C ++, Intel C ++, C ++ Builder. It has a static file system and this means that when a variable is declared, it is bound to a specific type and cannot be changed later, there is also a dynamic file system in which the variable is associated with the type not at the time of declaration of the variable, but at the time of assignment. Each file type has its advantages and disadvantages:

Static file typing eliminates a lot of errors when compiling a project, while writing the code is very complicated, but fast, and this is due to the fact that everything happens on a very simple machine level, in general, this typing is suitable for writing very complex code [2].

Dynamic file typing is suitable for creating simple programs and scripts, web services. It has drawbacks, for example, when creating a complex project, everything will work very slowly due to constant checks of variables, and some of them will be permanently stored in memory.

C ++ has had a huge impact on Java and C #.

To write a project in C ++, you will need to download additional programs, such as Visual Studio or GCC, in the future you will have to write gigabytes of lines of code and expect a very long compilation [8].

Features:
To create and compile a project, you need to install a development environment.
Preprocessing – processing the project code before compilation to detect errors.
Embedded functions – the compiler embeds the code at the place of the call.
Creating and using function templates and classes.
The mechanism for reloading functions.
Content evaluation

The C ++ programming language is quite difficult to learn, since writing a simple application requires knowledge of many basic languages and is enormous in size, besides a lot of time will be spent on developing the application.

Thus, C ++ is not suitable for writing our application.

C # Features (SySharp)
It is a programming language from the C family, in some cases it is slightly faster than C ++ and is suitable for a quick start in developing applications.
It is not cross-platform, although its alternative in the form of C ++ supports cross-platform, if you install additional modules. Debugging code is much more complicated. A small number of libraries compared with C ++.

JAVA Features
A programming language developed by Sun Microsystems, and now Oracle. Developed in 1995.
JAVA is used to create a variety of projects, from ordinary programs to web programs running from the browser – these are online chat rooms, browser games, audio/video players.
It has a high level of protection and relative reliability.
It has many development environments and supports cross-platform.
One of the development environments is Eclipse, an application for developing cross-platform applications, which has been developed since 2003.
The Eclipse development environment is designed to make it easier to write applications, it already has a lot of components, but most of the code needs to be written manually, and there may be many problems with connecting and configuring components, as well as transferring code from one copy of the Eclipse application to another [12].
Other development environments: Java Studio, Jbuilder, KAWA, Visual J ++, NetBeans, and many others.
All development environments are almost identical, some are paid, others are free, their functionality is almost the same, and development environments should not be compared.
Creating a project requires one of the development environments. Automatic memory management system. I/O filtering tools. Availability of tools for creating network applications. Availability of multithreading tools. Parallel execution of program processes. Content evaluation

Creating a project in this programming language is possible, but only after its full study. Since Java has many application development environments, with their help, as well as with the help of additional compilers, for example GDXLib, it is possible to compile the project under any of the platforms. Java is not suitable for developing my application, since it will take a lot of time to develop a set of elements (decent graphics, animations, game logic), to identify and fix problems [9].

Delphi Features
A programming language, as well as an application development environment.

In 1986, Object Pascal was developed, the author of which was Larry Tesler and Niklaus Wirth, the type system in the language was both static and dynamic.

Object Pascal was developed in the Clascal language, which is currently dead, like Delphi itself. And based on Object Pascal, Borland developed the Delphi language under the guidance of Anders Hejlsberg.

The company has also created many application development environments: FreePascal, EmbarcaderoDelphi, Inprise, Borland, BorlandKylix.

At the moment, the latest version of the supported development environment is Delphi 10.1 Berlin. This development environment supports x32 (x86) / x64 bit OS Windows, can compile projects under Mac OS, iOS and Android. Also, the development environment is currently owned by Embarcadero Technologies and is being sold in several editions [14].

The environment is currently developing in the direction of rapid development of cross-platform application software and can even interact with libraries from C. Delphi very much loads and does not free up PC memory with incorrectly written user code, which will undoubtedly interfere with the development of an online entertainment application.

Features:
Initial application development tools.

Many plug-in libraries.

Cross platform

Content evaluation

Delphi is suitable for developing simple applications, but not for our project, since our project includes complex functions (animation, smooth camera movement) and the project needs to be put on the site, and Delphi is not intended for compiling projects for the Web [1].

GameMaker Features
This gaming framework was developed by Mark Overmars on November 15, 1999; he wrote it in Delphi for students at the university where he taught. Until 2011, he constantly developed and improved his project, updates were released every year. Now the framework has been renamed Game Maker Studio, adding a lot of features and functionality [11].

The framework is conditionally free (there are many versions of the standard, professional...). In the standard free version, you cannot change the boot screens, there is no access to the early access of new versions, you cannot sell your project, test the project on mobile devices and buy additional modules, there is also no support for compiling on an OS other than Windows. All the features described earlier are available in the professional and full...
collectible versions of $150 and $800, respectively, the only difference is in the purchase of modules.

Starting from May 22, 2012, the framework becomes cross-platform, the framework developer opens YoYoGames company and further development becomes the most productive.

The GameMaker development environment supports many multilingual libraries and extensions, also has its own GML programming language and is integrated with the Steam service, which means that with the help of the Steam client, you can download the full-featured GameMaker framework, help from downloading your application to Steam [7].

Features:
Cross platform
The framework was developed by a teacher to train students in terms of creating educational games.
A huge database of downloadable libraries and extensions.
Integration with Steam.
Own programming language GML.

Content evaluation
GameMaker is demanding of knowledge of programming languages, since its GML based code writing language is based on C++, is cross-platform and these are its undoubted advantages, therefore it is suitable for developing my application [17].

AndEngine Features
This framework was developed by Nicholas Gramlichem in June 2010.
It is free and has open source, much has already been done for you and you do not need to develop something of your own in terms of basic aspects, the engine uses OpenGL, which means that the graphic component of the project will be at the high end level.

This framework does not have any official documentation, it is also inferior in performance to alternative projects, but instead of documentation it is possible to use training videos, of which there are an enormous amount in the Internet. There are also starting projects demonstrating examples of creating games clearly, and there is responsive technical support, and for a free framework this is a very big plus.

Development of the project on AndEngine is no different visually from Eclipse and other integration environments, screenshots will be superfluous.

Features:
Cross platform
Open source code.
Lack of official documentation.
OpenGL support.
Started content in the form of projects with visual examples of application development.

Content evaluation
This framework is used to write applications for PC, Android, iOS, and my application requires a web platform (html5) so that it can be put on the portal. Therefore, this framework is not suitable for developing my application.

Unity 5 Features
Developer Unity Technologies in June 2005.
This framework is cross-platform and supports almost all platforms, including PlayStation, Smart TV, Xbox, Wii.
Written in the C and Python family.
Unity editor is quite simple and functional, and also does not require high computing power.
System requirements for Unity:
OS: Windows 7 SP1+, 8, 10, 64-bit versions only; macOS 10.11+
Server versions of Windows & OS X are not tested.
CPU: SSE2 instruction set support.
GPU: Graphics card with DX10 (shader model 4.0) capabilities.
The rest mostly depends on the complexity of your projects. Additional platform development requirements:
The Unity framework is free with some minor restrictions. The professional edition costs from $75 per month with some additions in the form of Android and iOS pro packages for more than $75 for each of them. It is also possible to purchase an unlimited version for $1500 and as much for iOS and Android packages [10].
There is official documentation and many video lessons, as well as informal lessons and more.
Unity supports the PhysX physical module, has different scripts for the C language, JavaScript. Also, the program itself has a simple interface with moving and resizing windows, and it is possible to debug the game right during the test thanks to additional windows.
The world in Unity is divided into levels / layers (layers) and each of them contains a lot of objects, which in turn can be physical or just textures, can contain a certain functionality [15].
Objects may have a collision, and in this case there are several of them:
The wheel model, cube, sphere, capsule, landscape collage, a special model for characters, and you can also generate a collision model for any object, but this will put a heavy load on the project.
Many formats are supported:
Video formats mov, mp4, mpeg, mpg, avi, asf
Sound sm3, mod, ogg, aiff, mp3, it, wav
3D models ma, dae, mb, obj, max, 3ds, fbx
Text formats txt, xml, htm, bytes, html
Texture Formats tga, gif, png, psd, tiff, iff, jpg, dds, pict
In addition to the above, you can create your own textures, scripts in the Unity Store, as well as get from there the development of other people.
Features:
Cross platform
Debugging the project during the tests.
A lot of materials with detailed project development.
Support OpenGL, PhysX.
Starting content, Unity Store.
Intuitive interface.
Content evaluation
This framework is very good and fully suitable for my project, as it is cross-platform, easy to learn, has many lessons, has the latest PhysX technology, Rendering 3D and a large number of user-developed content.

**UDK (Unreal Development Kit)**
Unreal Engine 4 is a new generation framework that allows you to create projects of almost any purpose. From 3D models and whole 3D drawing of places with real textures, to absolutely any project. Also, thanks to the blueprint visual scripting system, you can design scenes, projects, animations by pressing without using programming languages.
The company developer framework Epic Games in 1998. The framework is cross-platform and supports almost all platforms, but requires additional software to be compiled to compile [3].
Special scripting is a (local) alternative to C++ (code can be recoded in both directions).
Creating a 3D model occurs by “mixing” a brush (mesh) of objects.
This type of object has many properties, but for now let’s talk about two: Additive and substractive. You can also apply your own textures to these objects.

Creating object shown in the image 1.

*Image 1. Creating an object using the additive and substractive options clearly*

*Image 2. Creating three-dimensional textures using CrazyBump*
The creation of textures requires the presence of any photo, then we need to smooth out the edges of the image so that the texture does not stand out too much when repeating and does not spoil the impression PixPlant is used [13].

After a successful “game with parameters” we got a great color applied to the brush, but it will not have volume, so we use Crazybump to create normals, collisions and other things from our image.

Creating textures shown in the image 2.

After these simplest operations, we can load all the objects we received into our project by dragging it into the content folder.

Also in the engine there is a system of destruction of objects, in which you can adjust the number of vectors, the influence of physics and other trivia.

You can also create 3D models, ask them a collision, then these objects can be combined into BluePrintMap and create buildings.

Features:
- Cross platform
- A lot of materials on learning to work with this framework.
- Support for new technologies.
- Starting content.
- Support for third-party models 3Ds Max, Maya.
- BluePrint proprietary graphic language.
- Content evaluation

This framework supports all the necessary functions for the development of our game with elements of training on the designed structure * See Figure 1.

Criteria for choosing a framework for writing an application:
- Cross-platform – this requirement for the developed on the basis of * See Figure 1 of the designed project is mandatory, as it is required to develop a web application, as well as a version for offline work [16].
- Stability, since users are not pleased when an application is closed with a critical error.
- The presence of starting content, because the more textures and materials developed, the easier it will be to master the material due to the given illustrative examples and you will not have to spend a lot of time searching for suitable textures [20].
- The presence of lessons, both official and user.
- Easy to learn in terms of an intuitive interface.
- All these criteria are fundamental for me when developing my training application. In the end, I chose the Unreal Engine, as it meets all the selection criteria.

Conclusion

In this paper, the entertainment portal is presented as a learning resource. The portal can also solve many other functions – from sales of sales (online store) and ending with communication via the Internet (chat).

The paper discusses in detail the modern software design technologies, the development of online portals, as well as technologies for developing an entertaining learning application. In particular, it is shown that various technologies of server platforms and CMS are widely used to create online portals, such as: Joomla, WordPress, Drupal and OpenServer, Denwer, Xampp. Each of these technologies has its own features, advantages and disadvantages, some of which must be considered when creating similar portals.

It is also shown that when creating an application, you can use various technologies and tools – programming languages: C, C#, C++, Java, Delphi, etc., integration environments and compilers: Eclipse, Visual Studio, AndEngine, libGDX and others, frameworks: Unreal Engine, CryEngine, Unity, Construct 2, HeroEngine [5].
After considering the features of the tools and technologies described above, it was decided to create an application on the Unreal Engine. This made it possible to compile the project for any platform, without spending much effort. In addition, the Unreal Engine has a graphical programming system and all the tools required to create a project.

To create a portal chosen CMS Joomla and server platform OpenServer. This provided tremendous opportunities in the development of an online portal.

The following processes and technologies were studied and used: the creation of 3D models, scenarios, model design, creation, work with lighting and sound, the implementation of physical models in a gaming platform. Details considered content management system site Joomla, server platform OpenServer and the Unreal Engine framework [3].

The developed game application can be used in schools for teaching lower grades to English words. It can also be used as a basis for creating other applications for the game portal [6].

Develop a learning application.

To create the project, it was necessary to download and install the Unreal Engine framework. After installing it and opening the launcher, Epic Games Launcher is a special “cover” application for updating the framework, downloading / buying / selling additional modules, as well as for opening, viewing information about your projects.

In this launcher it was necessary to download the framework version 4.11 itself. After we create an empty project.

With the help of the object panel, we will move LightMassVolume into this world, with its help, light will be brought into this area and will highlight objects.

Create a cube in the world and choose its height of 0.1, it will become flat, now you can apply a texture to it.

Create another 4 planes and apply textures to them, also add a 3D model and a camera with 2 positions.

Plains with textures and 2 game camera shown in the image 3.

Image 3. Depicted are planes with textures, 2 cameras, with smooth movement, background, playing field, 3D model of maps, planes of windows with textures

When creating textures, we used generally accessible resources – wood textures; pencil drawings from scanned albums were also used.

Use textures for cards shown in the image 4.
Results
Working project shown on image 5.

Image 5. Compiled working project

There is a login and account registration module, exit panels with information about platforms, links to the blog, contact information, information about the site, you can also open my laid out project on the HTML5 platform, also you can listen to music and watch videos directly on the site.

Issued the act of making.

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REFERENCE TO ARTICLE

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Key Compounds of Professional Competence of the Head of the Folklore Collective

Annotation: the subject of the research is the key components of professional competence. The purpose of the work is to develop and substantiate the concept of professional competence of the head of the folk group and identify its key components that determine the productive professional activity of a specialist in the preservation of traditional values and national artistic heritage through the organization and management of musical and creative work of the folk group. The research methods were the analysis of scientific literature in the field of folklore studies, cultural studies, psychology, sociology, pedagogy and ethnopedagogy, social and cultural activities, as well as the generalization of modern experience of the organization and management of creative activities of folklore groups. The results of the work are the systematization of competencies corresponding to the functions of the team leader, and the definition of prospects in professional training. The sphere of application of the results of the work can be scientific research of organizational and pedagogical conditions of formation of professional competence of the specialist of folk art culture and development in the sphere of social and cultural activities. The novelty of the research lies in the fact that the concept of “professional competence of the head of folklore team” is scientifically formulated for the first time and its integrative nature and key components that are associated in working with specific types of activity of the expert are identified. The main conclusions of the work are the need to find new forms of preservation of the cultural national heritage and the relevance of the problem of the formation of the key components of the professional competence of the leaders of folk groups.

Key words: professional competitiveness, leader, folk group, folk art culture.
JEL classification: I200, I290.

Introduction
The modern historical period is characterized by the weakening of sacred values, the destruction of traditional elements, the situation of crisis in General, there a folk culture is. The importance of the revival and preservation of traditional values is increasing. The society actively resists the destructive tendencies of post-industrial paradigm of existence, civilization scrap and the transition to a new ideological doctrine. Throughout the country the folklore ensembles are occurred, festivals of folk music of various level and scale, scientific-practical conferences, ethnocultural expeditions, workshops, meetings and seminars are held [15].

The need to search for new forms of folk education of the people and preservation of its cultural heritage is obvious to the leading figures of culture. And here the role of professionals
in traditional art is extremely large and diverse: the fixation (recording) of works of authentic folk art, the organization of accessible archives and their storage, decoding of these materials, the creation of folklore collections, their analysis and promotion, and finally, the expansion of works of regional song folklore in modern popular culture in the process of musical and creative activity of folk groups-ensembles of different directions, statuses and functions. They play an important communicative role in the process of folklore transmission to the new generation. And here are important in-depth knowledge, guidelines, understanding of the natural environment of existence, ownership of regional folk song traditions, and finally, the creative, organizational and managerial talent of team leaders. All this is professional competence, which highlights the key components that mostly predetermine the success of the professional activity of the specialist.

**Methods**

To solve the scientific problem of identifying the key components of the professional competence of the folklore group head the set of theoretical (analysis of scientific literature in the field of cultural studies, psychology, sociology, pedagogy and ethnopedagogics, folklore, socio-cultural activities, regional song folklore) and practical research methods (pedagogical modeling, experiment and observation, generalization of pedagogical and socio-cultural practices) are necessary, and also the assessment of modern experience in the organization and management of creative activities of folk groups is necessary.

The methodological basis consists of provisions in the sphere of theory and methodology of organization and implementation of the process of collective creative activity of the folk ensemble, the practice of preservation and enhancement of national artistic heritage, the revival of regional song traditions of the country. The concept of the study is developed according to the conclusions and achievements of modern scientists, who are highlighting the mechanisms and tools for the formation of professional competence of management personnel in the culture and art sphere; studying the principles and results of modern socio-cultural and ethnographic activities of collectives and institutions of folk art culture; setting out the theory of management and methodology of the organization of folklore ensembles and choirs; generalizing socio-cultural changes in modern society and in this regard, new mission statement of professional activities of specialists of folk art culture.

**Results**

Organizational and managerial, musical, creative and socio-cultural activities of the head of the folk group is associated with vocal and instrumental ensembles and choirs, both independent and related to cultural institutions engaged in the preservation and development of national artistic heritage. This area of activity requires a specialist deep knowledge of regional musical traditions and singing styles, the principles of organization and management of creative activities of the team, research methods and the basics of folklore, psychological, pedagogical and methodological approaches, the principles of socio-cultural projecting and conducting cultural and educational work [11]. At the same time, the leader is the same creator of folk culture and bearer of artistic traditions as the members of his team, the same missionary, designed to preserve and transmit the rich national experience to the new generation [6].

And each hypostasis of the head of the folk group requires certain competencies that complement each other and transform into professional competence— the ability and willingness to manage the musical and creative, performing and educational activity of the folk group, to solve complicated and numerous professional tasks, to develop and implement social and cultural projects in order to revive traditional rituals and folk festivals. The leader of the folklore ensemble should serve as an example for his subordinates, and therefore have musical and performing abilities, own the manner of singing characteristic of a particular region of the country, have a developed artistic – aesthetic taste, know the peculiarities of mores, rituals and beliefs, folk costume, repertoire of family and calendar cycles [13].
In addition, the head of the team is also necessary corresponding to different activities of scientific and methodological, psychological and pedagogical training, which determines the formation of individual and personal qualities used in communication and interaction with the team, training, development and education of young people on folk material [9]. Knowledge of the theory and methodology of ethnopedagogy and folk art education is one of the main conditions for the preservation and development of regional folklore and song traditions and familiarizing the new generation to the national culture through its active inclusion in cultural activities, increasing motivation to study, the introduction of folklore in modern life, the formation of value orientations and spiritual needs of young people in communicating with folk music.

Thus, the professional competence of the head of the folklore group appears as a result of the integration of the basic, key and special competences formed in the process of studying at the University, which are embodied in the professional and personal qualities, ability and readiness of the specialist to conduct the activities that are provided in the professional standard. At the same time, competence includes both theoretical knowledge and assumes the presence of moral attitudes, value orientations, “analytical, prognostic, planning and reflexive skills” [10, p. 90], and practical skills, including methodological and technological reserve, necessary for productive activities and professional tasks [14]. The fundamental feature of competence is a coherent system of values, norms and principles of professional activity [3]. This system determines the choice and performance of such actions, which are most conducive to the solution of professional tasks [17], determine the level of skill of the head [16] and indicate the mastery of “the whole complex of actions, involving a set of certain components for the successful implementation of certain activities” [9, p. 61].

General professional competences are synthesized in competence with comprehensive meaning and integrative structure. However, key competencies play a major role in this integration [1; 9]. The key components of the professional competence of the folklore group head are professional management culture, which includes theoretical and practical knowledge of the basics of the organization and management of the creative activity of the folklore group, monitoring and evaluation of the results of work, planning and projecting, and also personal and valuable attitude to musical folklore in General and regional song tradition in particular, a deep awareness of the necessity to preserve Russian folk culture, ability and willingness to research, preserve, perform and transmit folk songs of the regional tradition to the new generation. Only knowing the unsurpassed value of folklore, it is possible to understand the danger of its loss and devote the whole life to its preservation and development [3]. The combination of these key competencies leads to the formation of professional skills of the head of the folk group.

Professional management culture of the head of the folk group is formed on the basis of a combination of theoretical knowledge that determine the erudition of the specialist, the ability to perform specific actions, as well as the willingness to use the mechanisms and tools of management, to adapt quickly to changing socio-cultural conditions and effectively realize abilities and willingness to implement different activities [2]. Professional culture consists of:

– operational skills and abilities implying methodical and practical readiness for management of creative activity of folklore group, development and implementation of social and cultural projects, planning and the organization of group work [10];

– professional metaknowledges, including knowledge of a scientific-theoretical bases of psychological-pedagogical and communicative interaction with people, willingness to participate in the creative work of the team [18];

– ability of the head to self-analysis, self-assessment and self-criticism as a basis of management reflection, culture of communication in the system of collective interaction [14].

The personal-value attitude to musical folklore directs all the activities of both the leader and the folk group, and the awareness of the need to preserve Russian folk culture light the path
of a specialist, designed to explore, preserve, develop and transmit folk songs of the regional
tradition to a new generation. Such qualities as purposefulness and will, ability to motivate and
inspire colleagues, to create a situation of success, the desire for self-improvement, the presence
of high moral and ethical qualities, the ability to foresee the direction of further development
of processes in the sphere of folk art culture depend on the personal-value attitude. After all, the
leader of the ensemble or choir “is intended not only to provide a high level of performance, but
also to promote the development of value orientations, improvement needs of all its members”
[10, p. 88].

The absence of traditional forms of folklore and the presence of problems in the transfer
of the artistic heritage of young people within the family actualizes the issue of application
of educational and educational potential of folk art. The introduction of a new generation
of Russians to the national musical culture through festivals, holidays, concerts and other social
and cultural events is perhaps the only way to convey the ethno-cultural experience of the
people. “The difficult current situation in the sphere of ethnic culture requires not only the
restoration of artistic forms of folk culture, but also the reconstruction of the mechanisms
of functioning of folk traditions in the life of people (communication, festive and ritual practice,
family education, etc.), as well as the search for ways of their natural continuity” [3, p. 112].

Therefore, another key competence of the leader of the folk group is the ability to create
an educational, pedagogical, cultural and cultural space based on ethno-artistic material
and to develop new forms of involvement of young people in this space. In the XXI century
there was a clear change in the type of thinking and perception of the world, the dominant
of which is innovation. Folklore lives only in the context of emerging situations, before – ritual
and household, today – mostly professional and socio-cultural. However, folklore as a self-
developing and changing substance will not be absorbed by scientific and technological progress.
Any tradition can be updated and transformed by new trends and directions of development.
Realizing the realities of today, experts in the sphere of folk art culture recognize the need
to find innovative forms of attracting young people to folklore and its interpretation in modern
socio-cultural conditions.

Discussion

In order to implement innovative cultural activities aimed at the preservation and
enhancement of the national artistic heritage, an appropriate management structure
is needed. The management of the sphere of folk culture consists in the preservation, creation,
dissemination of ideas, knowledge, aesthetic and ethno-cultural values, as well as the
satisfaction of spiritual needs in social and cultural services. Achieving these goals requires the
creation and implementation of various activities related to the preservation and enhancement
of folk art culture.

The head of the folk group realizes musical and creative projects in cooperation with the
institutions of culture and art, which include museums, houses and palaces of culture, theaters,
media (television, radio, periodicals). The head of the folk group as a phenomenon of the
sphere of culture, providing the creation of conditions for the preservation and dissemination
of musical folklore, transfer to a new generation of ethno-cultural values and traditions, as well
as spiritual, moral, intellectual and creative development of society, must meet the specific
requirements due to the characteristics of the ethno-cultural and musical-creative activity and
its specific subjects.

The ethno-cultural environment formed in the society is gradually transformed from
the environment of the historical past into the environment of participation, involvement,
development of a person in the folk art culture, which necessitates the formation and
development of a special type of management. Management in the ethno-cultural sphere
is expressed in the concrete organization and regulation of activity of folklore collectives
which provide reproduction of national art traditions in social and cultural life of people; in the
development of strategic and current goals and objectives of the development of folk song traditions, preservation and enhancement of the artistic heritage of a particular region of the country.

The professional competence of the head of the folk group is determined by his focus on cultural activities aimed at promoting and broadcasting folk art traditions to new generations of citizens, his ability to organizational and managerial work and musical and creative self-expression in the form of folk song performing arts. The management of the folk group is a harmonious activity, which is based on the spiritual principles, personality, human resource, defined as a set of organizational relations, outlined within the framework of the most important mission of preserving the national artistic heritage.

Based on the fact that the sphere of creativity of folk groups has acquired today the character of both commercial and non-commercial activities, the head of such a team is obliged to be economically and legally competent specialist, and his work is measured with the regularities of cultural, historical and modern processes, human experience of communication and interaction. Since in the sphere of folk art culture the key figures of the process are mainly people of creative work, the process of regulation and coordination of their activities should be based on motivational and stimulating factors. In order to keep the best ideas and their bearers in folklore groups, it is necessary to create conditions for the development of the creative spirit, conditions for innovations.

The main feature of professional management culture is the category of creative activity, closely related to the natural foundations of folk art culture, where the primary qualities of management and Manager are originality, flexibility, non-standard thinking, the ability to generate ideas, to compute ways of their realization and to anticipate possible results. The structure of professional competence of the folk group head is associated with the implementation of its professional tasks, the ability to act. And the skill of performing professional actions is always associated with intelligence and thinking.

The thinking of a professionally trained leader of a folk group is manifested in the ability to see in specific conditions, in the current situation, a problem that implements the goal of professional activity, to transform these conditions, the situation and get closer to achieving the goal. Professional thinking is also needed to understand new challenges and identify unsolved problems. Solving professional problems, the head mentally assumes: the complexity and character of the task, structuring operations (analysis, synthesis, comparison, specification, generalization, systematization, etc.), with which carries out the search for the right solution and its possible result.

In modern socio-cultural conditions, the thinking of the folk group head should be focused on innovation, the search for “know-how”, breakthrough socio-cultural technologies, creativity, generation of ideas, new forms and methods of work, determines the innovative nature of activities in the folk art sphere. The thinking of a leader who is confident in the correctness of his work, works with a high degree of dedication, “does his best” at work, seeks to achieve the goals not only in his immediate work, but also in the work of the folk group in General and each of its members in particular, provides an active creative atmosphere. The head of the folk group ensures the development of creative potential, therefore there is the need to have innovative thinking, able to develop and implement innovative projects in the field of folk art.

Within the framework of the methodology of teaching the mechanisms of mental activity, its active forms stimulate and develop such creative approaches as problem solving, organizational and activity games, innovation and project seminars, trainings, social and cultural design, etc. The Methodists pay special attention to the program-project approach—a system of practical activities that can be identified and transformed in the process of creative research and practical implementation in the subject of transformation. Recently, the technologies of formation
Conclusion

In addition to the above-stated basic, key and special competencies, the team leader must master the methods of scientific research in the sphere of Ethnography and folklore, search and analysis of theoretical material and practical experience, digital technologies and a variety of ways to present the results of the team and promote national musical art both within the country and abroad. The transfer of traditions means the development of society by means of folk art culture, which should fill the socio-cultural space and human activity in the modern world. Only this determines the multiplication and preservation of the artistic heritage of the people. Therefore the high moral responsibility of the head of the folk group as the guardian of the traditions of folk art and the leader of the movement of its revival in the XXI century.

The study of the key components of the professional competence of the head of the folklore group leads to the conclusion that the professional training of students of this profile requires the use of a three-level system of training of a specialist of regional folklore; a performer of traditional folk songs; a Manager in the area of innovative socio-cultural design [17]. At the same time, all the competencies formed in the University “in the field of artistic, creative, cultural and educational activities are less important in adapting to the profession than psychological, pedagogical and individual organizational abilities: mobility, mediation, the ability to predict the development of creative teams, the ability to find optimal solutions, etc.” [9, p. 50]. Against the background of the falling of sacred values, the destruction of traditional elements, the situation of crisis in General, in which there is a folk art culture [13], professional training of competent leaders of folklore groups that can revive the interest of contemporaries to the heritage of the past and make it a phenomenon of the present, acquires special importance.

References


REFERENCE TO ARTICLE

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The Role of Hungary in NATO and Its Current Activities Within the Organization

Annotation: against the background of growing international tensions in Europe, and specifically in its eastern part, the formation of Hungary’s independent position on many debatable issues on which the European Union, of which this state is a member, has become accustomed to act single opinion. Today, as one of the main levers serving to promote and defend its position for Hungary is NATO. This article explores how this state influences the course of events in the field of international relations in this subregion through NATO. In addition, it was also important to consider what foreign policy issues today are the most pressing for Hungary. How did the organization, which initially acted as a guarantor of security from engaging in the Yugoslav conflict, which served as a catalyst for the implementation of the most important reforms in the defense sphere, became a tool for expressing foreign policy interests? Particular attention is paid to recent disputes and disagreements with Ukraine over the adoption in this country of educational reform, which in a significant area will reduce access to the study of their native languages by ethnic minorities, as well as about the increased activity of the Ukrainian armed forces in the territories of Transcarpathia, where day there are some ethnic Hungarians.

Key words: Hungary, NATO, Euroatlantic integration, Visegrad four, Military reforms.

JEL classification: A140.

Introduction

The end of the “cold war” turned into a serious political change for Hungary, which, along with the collapse of the USSR and the Warsaw Pact, made this country independent in choosing its foreign policy. As early as April 1989, Hungary was a full member of the political and military structure of the Warsaw Pact and the Council for Mutual Economic Assistance, and Soviet troops were still in the state. The number of troops of the Hungarian army at that time was about 150,000 people, and government military spending was just over 3.5% of the country’s GDP. However, in the early 90s of the XX century, one of the priorities of the foreign policy of Hungary was identified the country’s accession to NATO. It should be noted that even before the collapse
of the Warsaw Pact, Hungarian political circles were talking about the feasibility of integrating the country into the North Atlantic Alliance [13].

Methodology
The methodological basis of the study was: system analysis, comparison, event analysis, analysis and synthesis of special literature.

Results
The first decisive steps in Hungary's foreign policy after the country's transition to democracy in 1989 were aimed at restoring sovereignty and freedom of international activity, and later at reorienting and adapting the country to the European development model. An integral part of this process was the adoption of the basic principles of the European security model, the most important component of which is the interaction of states within the North Atlantic Treaty Organization.

In addition to reorienting to the pan-European vector of development, it is worth highlighting other important events that pushed Hungary and other countries of Central and Eastern Europe towards joining the alliance as soon as possible. The first of these was the outbreak of war in Yugoslavia, which immediately caused the fear of the entire European continent. Hungary and other CEE countries are geographically located in close proximity to the Balkans and, therefore, they feared the spread of this conflict to their territories. Another factor was the fragility and lack of formation of newly acquired sovereignties of the countries of Central and Eastern Europe, which put these states in a kind of marginal position in the integration processes of Europe that had been forming for a long time. This contributed to the development of cooperation between these states among themselves to protect their own sovereignties. In a conversation with US President Bill Clinton at the opening ceremony of the Holocaust Memorial Museum in Washington in April 1993, Czech President Vaclav Havel described the situation in CEE countries as follows: “Our main problem is that we live like in a vacuum, therefore we want to join to NATO. In addition, because of our values and our spirit, we are part of Western Europe” [19].

It is no secret that to obtain the status of a full member of NATO, any state must fulfill a number of conditions in order to meet the standards of the organization. First of all, each candidate state must meet military, political, economic, and legal requirements set forth in the 1949 North Atlantic Treaty. It is worth noting that even representatives and analysts of the Alliance admit that admission criteria are very complicated, but they note that the alliance takes into account the specific situation within each candidate country and is always ready to make certain concessions, which was very important for Hungary, whose army at the time of the collapse of the ATS was armed by Soviet standards, which fundamentally went against NATO standards.

First of all, the candidate state must apply to the NATO Council to include its organization. A preliminary stage for this may be military cooperation, for example, conducting joint exercises. Since 1999, with the approval of the application by representatives of the candidate country, the Action Plan on the preparation of membership in NATO (MAP) is signed. It is compiled for each country individually, but it includes a number of standard mandatory conditions. These include the settlement of various territorial disputes with neighboring countries. Also, the control system of the armed forces should become more open and democratic. For this, the post of Minister of Defense should be held by a civilian specialist. And for successful joint cooperation with the forces of the alliance, the army of a country joining NATO must meet modern standards for personnel training, and also have modern weapons.

If there are military formations of another state on the territory of the country, the issue of their withdrawal should be resolved. This is also required by NATO, since, by joining this organization, the state should no longer militarily help and rely or be militarily dependent on countries outside the North Atlantic bloc.

After all the conditions of the agreement have been met, this is communicated to the NATO Council by sending a letter. After that, the organization must ratify the agreement on the candidate...
state's membership in the Alliance. If the outcome of the negotiations is successful, the documents are sent to the parliament of the candidate state. After he approves the entry into force of the document, it must be signed by the head of the country – the president or, in some cases, the monarch. With the implementation of these actions, the country officially becomes a member of NATO, receiving from it various foreign policy results. However, one must be prepared for the fact that membership in such an organization imposes restrictions on the country, in particular in the area of the search for partner countries in the political arena.

Hungary's participation in European security processes was primarily hindered by its membership in the ATS, as well as the presence of the Southern Group of Forces of the USSR Armed Forces located here after the events of 1956 on this country's territory. Beginning in May 1989, in connection with the unilateral reduction of the Soviet armed forces, the withdrawal of troops from Hungary began, which was finally completed on June 16, 1991 [1, p. 219].

The first serious step leading to Hungary's membership in NATO was the emergence in November 1991 of a new Strategic Concept for NATO. It was radically different from the previous strategic documents of the alliance. First, it was not aimed at confrontation and was open to the public; secondly, ensuring the security of member states, that is, collective defense, remained the fundamental purpose of the concept, but it was aimed at improving and expanding security for Europe as a whole through partnership and cooperation with former rivals. The use of nuclear weapons was reduced in concept to a minimum level sufficient to maintain peace and stability.

It is important to note that the above-mentioned Strategic Concept of NATO still took into account the existence of the USSR in its text and could rather assume only close cooperation with the states of the Eastern bloc, but not their membership in the organization. CEE countries began to actively declare their intentions to become full members of the North Atlantic Alliance in mid-1992, after the collapse of Czechoslovakia. Specifically, Hungary took the first initiative on March 8, 1993: Prime Minister Jozsef Antall informed NATO Secretary General Manfred Wörner of the state's intention to join the Alliance [20].

The second stage was the disintegration of the Warsaw Pact, which took place on July 1, 1991, to which the substantial contribution of Hungary and the emergence of the above-mentioned Strategic Concept of NATO contributed significantly. In 1991, Hungary, Poland and Czechoslovakia formed their own association called the Visegrad Group, the purpose of which was to facilitate the integration of these states into Euro-Atlantic structures.

Initially, the question of accepting Hungary and the CEE countries in NATO caused some controversy. This distrust on the part of the North Atlantic Alliance was associated with Hungary's unsettled relations with its neighbors, primarily with Romania, in which after the signing of the Trianon Treaty in 1918 a large number of Hungarians began to live. The fact is that under the terms of this treaty, Hungary, as a state defeated in the First World War, gave part of its territory to neighboring countries. Thus, Romania received from Transylvania region of Hungary, in which to this day lives a huge number of ethnic Hungarians who do not recognize the Romanian government. Although this conflict was in a cold stage, NATO feared an escalation of differences, therefore the issue of settling relations between Hungary and Romania was included on the North Atlantic Alliance agenda. On this issue, the parties concluded in 1996 an Agreement on mutual understanding, cooperation and good neighborliness, which, in addition to ensuring the inviolability of borders and territorial integrity of each state, included provisions for regular consultations on security, defense, regional stability and mutual support for integration into NATO and The EU. This event contributed to the increase of confidence in Hungary from NATO. It is worth noting that, despite the existence of such a treaty, Hungarian-Romanian relations today are experiencing not the best of times. The parties continue to exchange protest actions and unflattering statements against each other [15, p. 213].

The preparation for membership in the North Atlantic Alliance has been conducted by Hungary since 1990. The period from 1990 to 1994 can be considered the initial stage of this training.
During this period, a number of reforms were carried out, which are necessary for the creation of armed forces according to the standards of the North Atlantic Alliance:

- developed new principles of security policy and national defense;
- the Law on National Defense was adopted;
- the terms of military conscription were reduced from 24 to 12 months;
- an alternative civil service has been introduced;
- introduced a new form and symbolism.

In 1995, the old conscription system, based on fixed-term service, was restructured into a mixed system, with both urgent and contractual bases for serving in the armed forces [4].

Significant structural and organizational changes occurred as a result of further reforms. On September 1, 1997, the Joint Headquarters of the Hungarian Armed Forces was created according to NATO standards. In addition, the structure of the Hungarian armed forces was changed, the Ground Forces and the Air Force were reformed. The Armed Forces themselves were divided into three categories: Rapid Reaction Forces, Main Defense Forces, Military Reserve [17].

It is important to mention that the reform of the armed forces of Hungary in connection with the raging Yugoslav conflict was very cautious and gradual, since on the one hand the country needed NATO's security guarantees for its borders, which prompted the national authorities to reduce the armed forces in order to join the Alliance, on the other – the fighting in the neighboring Balkans required the presence of a combat-ready army at the border, which forced the authorities to delay the complete abolition of military service in the army.

Special mention is made of the declaration of the Partnership for Peace program, which has become a new milestone in the development of the European security system. This program was an initiative of the North Atlantic Treaty Organization aimed at creating an atmosphere of trust between NATO and other states in Europe and in the post-Soviet space. This program envisaged the possibility of cooperation in international missions, joint planning of the military budget, the mutual exchange of information between NATO-owned and non-NATO countries. The Partnership for Peace was launched on January 11, 1994. For Hungary and other countries of Central and Eastern Europe, this initiative allowed for building a direct dialogue with NATO.

Under this program, on December 5, 1994, Hungary adopted the Individual Partnership Program, under which Hungary became involved in the work of all working committees open to NATO for partner countries, and the Hungarian armed forces began to participate in joint exercises of NATO countries and member countries of the Partnership for Peace [14].

Thus, Hungary, together with Poland and the Czech Republic, turned out to be the most prepared countries for joining the North Atlantic Alliance and were officially invited to the organization in July 1997 within the framework of the NATO Madrid Summit. In December of the same year, at the level of foreign ministers, agreements on the expansion of NATO were signed. After that, at the initiative of the Hungarian parliament, a national referendum was held in the country on the country's accession to NATO. It took place on November 16, 1997 with the participation of 49.24% of all Hungarian citizens eligible to vote. 85.33% of voters voted for the entry of Hungary into the North Atlantic alliance and 14.67% against [3]. Already in February 1998, the National Assembly of Hungary adopted a resolution on the results of the referendum, thus giving it the force of law [11, p. 899].

Finally, on March 12, 1999, the ratification documents sent by Hungarian Foreign Minister János Martonyi, as well as his colleagues from Poland and the Czech Republic, were adopted by NATO Secretary General Madeleine Albright, which meant Hungary's accession to the status of full member of the North Atlantic Alliance.

Hungary's accession to NATO allowed the country, above all, to receive certain security guarantees, which was very important given the raging war in neighboring Yugoslavia. NATO also received some advantages: the proximity of Hungary to the Balkans allowed the alliance to increase control over the situation on the peninsula. Hungary became a kind of "island
of NATO” in the Balkans, which played a certain role in shaping the subsequent security strategies of the Alliance.

The Hungarian contribution to membership and in its first period was mainly expressed by permits from the national authorities for the use of airports and the airspace of the country. In addition, Hungary allowed the NATO countries to deploy on their territory ground military contingent.

In 1999, the North Atlantic Alliance launched a NATO Membership Action Plan (MAP) program designed to assist countries that are planning to become members of NATO. This program provides candidate countries with feedback on their actions related to preparing for NATO membership and adhering to NATO standards. Hungary in the framework of the MAP tried to transfer its experience to candidates, showing by example the positive consequences of cooperation with NATO, obtained as a result of the Partnership for Peace program, and in the framework of bilateral cooperation with individual countries of the Alliance. So, with some support from Hungary, Romania, Slovakia and Slovenia became members of NATO as early as 2004 [9].

Discussion

As she stayed in the Alliance, Hungary sought to become more involved in NATO activities around the world. Thus, the Hungarian Republic played a certain role in the composition of the combined forces of the Alliance during the Kosovo war, sent a military contingent of 300 men to Iraq in 2003 (it was withdrawn and returned to Hungary as early as 2004). In addition, in 2003, Hungary sent several infantry detachments to Afghanistan, where they operated under the German command until 2013. Now, more than two hundred Hungarian soldiers are in Iraq, where they are fighting against IS.

The government gained a wider scope of activities regarding participation in NATO operations as a result of an amendment to the Constitution at the end of 2003. This amendment regulates the transfer of the right to permit the use of armed forces at home or abroad as part of NATO activities within the competence of the Hungarian government. This amendment is of fundamental importance, since it provides greater flexibility in the adoption of domestic legislation necessary for the implementation of joint military operations. The decision-making procedure can be completed, in the optimal case, within ten minutes, in contrast to the time previously spent at parliamentary sessions.

It is also worth noting that in 2004 the Hungarian government adopted a resolution on the accession to the Joint Air Defense System of NATO, which made it possible to ensure the interaction of the Hungarian Air Force and air defense forces with the NATO.

Over the next few years, Hungary has advocated the strengthening of transatlantic cooperation. In addition, Hungary contributed to strengthening the influence of the North Atlantic alliance around the world based on common values.

Hungary actively supports the intensification of political and practical cooperation between the EU and NATO, considering that the most complex and sensitive issues of international security should be decided by the organizations jointly [16].

Together with the strengthening of its position in NATO and the EU and the stabilization of the internal situation in the country, which was undermined by the international economic crisis of 2008, Hungary is beginning to form its own special international position, with which other actors have to reckon. Speaking about the manifestation of such within the North Atlantic Alliance, it is worth highlighting dissatisfaction with the state’s political course of Ukraine, namely, harsh criticism of the law “On Education”, which came into force on September 28, 2017, one of the main provisions of which provides for teaching children of minorities in the Ukrainian language, and concern about the resumption of the military base in the city of Beregovo, in which ethnic Hungarians constitute a significant part of the population. In this regard, on September 26, 2017, the Hungarian Foreign Ministry announced that they would block any further rapprochement between Ukraine and the EU.
For the first time after the political crisis, Ukraine’s path to the transatlantic community is actively blocked by the EU and NATO member states. Despite the fact that Prime Minister Viktor Orban opposes sanctions against Russia and is a partner of President Vladimir Putin in the EU, Hungary, as a rule, tried not to depart from the common vector of NATO and the EU, aimed at supporting Ukraine. However, everything changed after the adoption in Ukraine of a new educational law in the fall of 2017, which caused objections from the Orban government.

Before the adoption of the new law, Hungary actively helped Ukraine. It is worth noting that it was Hungary that became one of the first EU member states, which ratified the Association Agreement between the EU and Ukraine. Hungary’s policy toward Ukraine was largely in line with the course of the Western allies, which included support for sanctions against Russia. Hungary also supported the idea of introducing a visa-free regime between Ukraine and the EU, above all, given that more than 150,000 ethnic Hungarians live in the Transcarpathian regions.

It should be noted that the first deviations from the pan-European political course began to be observed immediately after the Ukrainian political crisis. So, in May 2014, immediately after the annexation of the Crimea, Orban demanded autonomy for the Hungarians in Transcarpathia (the territory of Ukraine, which previously belonged to the Austro-Hungarian dualistic monarchy before its defeat in the First World War). It is not surprising that this move drew serious criticism from Ukraine and Poland. In September 2014, just three days after Gazprom CEO Alexei Miller visited Viktor Orban, the Hungarian government temporarily suspended the transfer of the reverse flow of gas to Ukraine, and the Hungarian media increasingly began to take a pro-Russian position, reporting on one or another event.

Despite these deviations, until the fall of 2017, Hungary, in general, continued to adhere to the course of NATO and the EU with respect to Ukraine. Everything changed after a successful vote in the Verkhovna Rada on the adoption of a new educational law, which, in the opinion of a number of neighboring countries, limited the rights of national minorities in Ukraine. The subject of discontent was one of the provisions of this law, which provided that, starting from the 5th grade, the education of children belonging to national minorities would be in the Ukrainian language, and the native language would be taught in a separate discipline [2].

After the adoption of the law, Hungarian Foreign Minister Peter Siyarto said that the country would block any initiatives to bring Ukraine closer to NATO and the EU, which would require the consent of all members of these associations. The Hungarian government also pledged to initiate a revision of the Association Agreement between the EU and Ukraine. Following these promises, the Ambassador of the Republic of Hungary to NATO said that Hungary would block all events between Ukraine and NATO that are held at a level higher than the level of ambassadors [7].

There is no doubt that this education law is controversial, as evidenced by concern about this from some other neighboring countries, such as Moldova, Poland, Russia, Bulgaria and Greece, but none of these states criticized it so sharply as Hungary did it. The law caused a negative reaction throughout Europe. On October 12, 2017, members of the Parliamentary Assembly of the Council of Europe (PACE) adopted a resolution condemning the Ukrainian law on education for violating the rights of national minorities. 82 out of 110 parliamentarians were in favor of adopting a resolution, 11 were against, 17 abstained. Despite proposals from the Ukrainian authorities to make exceptions for the national minorities of EU member states, Hungary has not changed its tough position on Ukraine. Representatives of NATO member states began to talk about the “obsession” of Hungary over Ukraine.

It is worth noting that the promise of the Foreign Minister of Hungary to further block Ukraine-NATO meetings did not become an empty sound. Thus, Hungary imposed its veto on holding meetings of defense ministers within the framework of the Ukraine-NATO Commission, which was to be held in December and February 2018. Despite the requests of Ukraine and the agreement of the most influential members of the North Atlantic Alliance, Brussels did not confirm the date of the meeting of the NATO-Ukraine Commission at the level of defense ministers [6].
A meeting of this format, scheduled for April 27, 2018, was also blocked by the Hungarian side in the same way. Such a meeting of defense ministers of all NATO member states is one of the rare opportunities when the head of the defense department of Ukraine can personally contact the defense ministers of all NATO countries. It is important to note that Hungary did not block the meeting of the commission held at the level of the ambassadors of the NATO countries in December 2017.

The initiative of Ukraine to restore the military base in the city of Beregovo in the Transcarpathian region has become another stumbling block in bilateral relations with Hungary. The city is in close proximity to the border with the Hungarian Republic, and the ethnic majority in it is made up of Hungarians (almost 13 thousand people). The Ukrainian side plans to deploy a battalion of 800 people in the city, explaining that by necessity, for the sake of maintaining territorial integrity. The Hungarian side was indignant when it decided that the Ukrainian authorities consider the Hungarian national community a threat [8, p. 121]. In response to this action and the absence of any progress regarding the law on education, Hungary within the North Atlantic Alliance intends to block the holding of the next meeting of the Ministers of Defense of Ukraine and the EU, as well as the Ukraine-NATO summit with the participation of President Poroshenko scheduled for July 2018 of the year.

Nonetheless, the United States and other NATO members continue to urge the Hungarian authorities to settle relations with Ukraine and other neighbors on a bilateral basis.

What is the reason for this reaction? Despite Hungary’s membership in European integration associations, Viktor Orban regards Russia as an important ally. First of all, such cooperation is supported by financial and technical assistance from Russia in the development of the Hungarian energy sector. Currently, the main joint energy project is the construction of the Paks-2 nuclear power plant in Hungary. At its core, Paks-2 is a project to complete the construction of two additional power units that have existed since the time of the ATS of the Paks NPP. “Rosatom” will have to supply units. Under their installation from Russia is investing [5]. This project came under close attention of the European Commission, which in November 2015 launched an investigation into the sources of financing for the construction of the Paks-2 NPP. The commission was going to find out whether the project is being implemented on market conditions or whether it is a question of state aid, and to understand how this affects competition. In November 2016, the EC closed the investigation. Orban is counting on expanding cooperation with the Russian Federation [18].

**Conclusion**

Speaking about the role of Hungary in NATO, it should be said that it is not so significant due to certain circumstances. In principle, it cannot be argued that the membership of Hungary in NATO in all aspects had a positive impact on the country’s defense capability. Rather, on the contrary, by bringing its army under the standards of the organization, Hungary reduced the size of its armed forces. As for the activity of Hungary in the North Atlantic alliance, it mainly consists in the participation of a few military contingents sent from the country in NATO exercises and military operations. In this case, it is impossible not to note a number of positive consequences of joining the organization. First of all, NATO is the most important platform for Hungary to advance its national interests. In addition, by joining the North Atlantic alliance, Hungary to some extent was able to protect its territory from the penetration of the conflict in the Balkans by allowing NATO troops to be stationed at the borders. In addition, by joining the alliance, Hungary, being one of the countries of the former ATS, showed that the priority of its foreign policy development is democratic development with active cooperation with Western countries [10]. Hungary, together with Poland and the Czech Republic, became a kind of example for Romania, Slovakia, Slovenia, Bulgaria, Latvia, Lithuania and Estonia, which joined the alliance during the next expansion, in 2004. Thanks to military cooperation with Western countries, Hungary has the opportunity to receive modern weapons and equipment. Consistent
implementation of all NATO standards and a radical reform of the army allowed Hungary to greatly reduce the corruption that existed in the pre-reform armed forces that existed under the old Soviet system, to improve and simplify the training of troops and create a professional army, whose service is conducted solely on a contract basis.

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Changes in the UK Foreign Policy Vector After the Referendum

Annotation: the article discusses the foreign policy course of Great Britain when joining the EU and after. Particular attention is paid to the future prospects for the development of the foreign policy vector of the UK policy after the withdrawal from the European Union, which was decided in the framework of a referendum on maintaining UK membership in the European Union in 2016.

Key words: UK, EU, referendum, Brexit, Brexit consequences, trade, economy.

JEL classification: A140.

Introduction

Not long ago the European Union was assessed positively by the scientific community and the media: they spoke of its world-historical significance as the most advanced regional integration project, in which the process of mutual unification of member states covers all aspects of public life (economy, social sphere, domestic and foreign policy). They noted the perfection of the system of supranational institutions, carefully studied and spread the European experience, analyzed the growing interaction of economic structures localized in different countries – members of the union, as a logical development phenomenon. However, few scientists were ready to soberly assess the problems and prospects of the EU. The rhetoric dramatically changed when the internal contradictions that emerged in the laws of development of European integration, significantly exacerbated and, as a result, came out.

The organization, that was born in the suburbs of Reims, where on May 7, 1945, General Alfred Jodl signed a document proposed by General Eisenhower, began to fall apart in Manchester City Hall, where on June 24, 2016, an anonymous local municipality official declared that the UK exit campaign won the referendum. The main result of the referendum is the beginning of a long and complicated “divorce” process of Great Britain and the European Union, or Brexit (“Br” – Britain and “exit” – exit). It is worth noting that Brexit’s implications for UK foreign policy are rather vague, with many different opinions expressed, from the most negative to moderately positive.

Britain filed applications for membership in the European Economic Community in 1962 and 1967, but France prevented them from doing so. French President Charles de Gaulle became a key opponent of the accession of Great Britain to the EEC, which believed that thanks to its “special ties” with the United States, the United Kingdom would play a negative role in the union, putting the unity and independence of the EEC in relations with the US at risk. Only in 1969, after de Gaulle’s resignation, negotiations began on the entry of Great Britain into the European
Community, and from January 1, 1973, the United Kingdom became a member of the European Economic Community.

Despite the fact that at the time of joining the EEC, the UK economy lagged far behind the pace of development of France, Germany or Italy, Misty Albion nevertheless sought to maintain the maximum possible independence in solving important economic and political issues. In particular, the country boycotted important European integration initiatives: it did not enter the Schengen zone (1985), did not sign the EEC Charter on Basic Social Rights (1989), withdrew from the exchange rate mechanism of the European Monetary System (1992). In March 2012, at the EU summit, London did not sign the “Budget Pact”, lobbied by Berlin and Paris and introduced a strict framework of financial discipline [5, p. 57].

43 years later, on June 23, 2016, a referendum was held in the United Kingdom and Gibraltar on whether the United Kingdom should remain a member of the European Union or leave it? Citizens of Great Britain, Ireland and the Commonwealth countries participated in the voting. According to the report of the election commission, more than 46,5 million people took part in the referendum. Most (51,9%) of Britons who took part in the referendum (or 37% of the total electorate and 26% of the total population of the UK) voted for leaving the EU, 48,1% were against [6, p. 3].

The main result of the referendum is the beginning of a long and complicated “divorce” process of Great Britain and the European Union, or simply Brexit (“Br” – Britain and “exit” – exit). “Britain’s historic decision to interrupt the 43 years of love-hate with the European Union will be a decisive moment in British history along with two world wars of the 20th century,” says Patrick Wintour’s international department of The Guardian. The trouble is that while there is no precedent, the starting point for the procedure of divorce [1].

Negotiations on Brexit officially started a year after the referendum – June 19, 2017. The UK and EU negotiating teams met face-to-face for one week each month, with several additional sessions. Their first steps were aimed at determining the rights of emigrating British and EU citizens after Brexit, determining the amount of money the UK would have to pay as “compensation”, the so-called “divorce bill”, and resolve the issue of the border of Northern Ireland. A preliminary agreement on these issues was reached on December 8, 2017. In the absence of radical political changes in the United Kingdom, in the second quarter of 2019, the United Kingdom will not be a member of the European Union.

It is worth noting that the consequences of Brexit for the UK are rather vague. A wide variety of opinions were expressed – from the most negative to moderately positive. According to experts, in the coming years, the UK will face serious negative consequences of leaving the EU. It is likely that the United Kingdom will be detached from the development of new economic rules that operate not only in the EU, but also have a noticeable impact on the UK’s economic partners. The rejection of the EU Common Agricultural Policy, supranational regional policy (“cohesion policy”) and science and technology policy can be the most painful for the country. However, the most painful consequence for the United Kingdom may be the outflow of investing companies from the country. That, as a result, will lead to the decision of leading financial multinational corporations to replace the City of London with other alternative cities or financial centers outside the EU [4, p. 17].

We should not forget about one of the motivations for the outcome of the referendum: the restriction of immigration and the new regulations in the sphere of migration legislation that solve this problem [9, p. 112].

Before the referendum in May 2016, immigration held the first place among the most acute problems of Britain – 39%, followed by the National Health Service (32%), the European Union (28%), the economy (23%) and education (18%). This indicates that the relevance of the immigration issue not only did not weaken after the referendum, but most likely even continues to increase, and this state of affairs is not only and not so much connected with the actual
severity of the immigration issue, as with exaggeration and exaggeration of this topic in the mass media information and at the political level.

A number of experts believe that the former categoricalness in evaluating the effects of the referendum on the UK economy has disappeared. In this “exemption from the close embrace of the EU” they find an opportunity to boost the local economy, for example, the most regulated by the European Union, agriculture [9, p. 110].

To oppose the negative effects of Brexit any positive effects of his adherents can not, except for the restoration of absolute state sovereignty. But here, too, they are likely to be disappointed. The current and future British government will look for options for a “soft” divorce in order to minimize economic losses and to maintain any preferences in economic relations with the European Union.

Methods

The study of this actual problem was carried out on the basis of an integrated systems approach using the following research methods: general scientific, formal logical, comparative, historical.

Results

It is worth noting that the withdrawal of the United Kingdom from the EU is not yet an event. Since the parameters for the “divorce” are still not clear. Therefore, an analysis of the consequences of Brexit on the foreign policy vector of the UK’s policy is possible only in terms of predicting plausible scenarios. First, the UK will retain full participation in a single domestic market in the Swiss model, that is, formally, London ceases to be part of the EU, while maintaining most of the existing ties. This scenario will limit the sovereignty of Great Britain and will require it to abide by the rules ensuring the freedom of movement of workers. Secondly, the free trade regime with some elements of financial and investment cooperation can form the basis of relations between the European Union and the United Kingdom, thereby securing its position between Europe and the United States with sovereignty and special relations with Washington. Along with the US and the EU, the UK will be able to participate in the Transatlantic Trade and Investment Partnership (TTIP). Since this partnership minimally hampers the economic sovereignty of the country, which does not imply a large regular load and liberalizes trade in goods and the movement of capital. The presence of the United Kingdom in the TTIP is attractive to all interested parties, as this will preserve transatlantic solidarity in the new agreements. Of course, this option is acceptable if the TTIP project itself is implemented, for which many political analysts have doubts.

Discussion

The topic of this article is determined by the fact that the process of a member state’s exit from the European Union is currently taking place, which currently has no analogues among regional integration associations. There are many points of view on the consequences of the UK exit from the European Union both for the state itself and for the integration union. Of course, a comprehensive study of this problem is significant for both scientific thought and practical implementation, since the findings in this study can be used and adopted in the event of a state’s withdrawal from the integration union.

Conclusion

For centuries, Britain was ruled by a complex and fairly cohesive political elite, which, protecting national interests, is well aware of the main duty of the state – ensuring the well-being and safe existence of its citizens. Although official London’s foreign policy priorities are constantly evolving, successive governments follow the course of using all available means – from maintaining and strengthening national armed forces capable of conducting offensive operations at a considerable distance from the British borders to international organizations – and above all United Nations and the Security Council, in structures of other international and regional organizations.
As acknowledged by the British Prime Minister, Theresa May, the referendum split the country into two camps – supporters and opponents of such a decision. As a result, a political crisis erupted in the country, raised the question of the integrity of the country.

In Scotland, Northern Ireland and Gibraltar, most Brexit referendum participants did not support the decision to withdraw from the European Union. The majority of Scotland residents expressed a desire to stay in the EU (62% “against”, 38% – “for”). In Northern Ireland, 56% voted to stay in the EU [7, p. 117].

Gibraltar and the overseas territories of the United Kingdom occupy a special position – they have their own ideas. Thus, although Gibraltar is not part of the EU Customs Union, many agreements adopted in the EU directly affect its interests. Opponents of Brexit point to its inevitable catastrophic economic consequences for the country. Economists predict foggy Albion further decline in business activity, and French President Emmanuel Macron even predicted a fate similar to tiny Guernsey Island in the English Channel [2].

Brexit has closely raised with the UK the question of revising and reformatting its trade, economic and foreign policy relations with the EU. Preferring a “soft” version of Brexit, Britain seeks to preserve the benefits of trade with the EU. A special role is given to ensuring free access to European markets (the formation of a free trade zone and the conclusion of a new customs agreement with the EU). For London it is very important to conclude new trade agreements with other countries, the creation of free trade zones with them. After the first stage of negotiations between the UK and its partners in the EU, agreements were reached on three main issues, which together will serve as the basis for the relations of the parties after 2018:

1) to protect the rights of EU citizens in the UK and British in the EU:
   - agreed to mutually avoid unnecessary administrative barriers in determining the status of citizens already living in the territory of both parties;
   - special relations have been established on issues affecting existing migrants, as well as on the right of their families to be reunited;
   - a 7-year transition period has been established to maintain the appellate jurisdiction of the European Court of Justice in respect of judgments rendered by the British Court;

2) the format of the special status of the island of Ireland – the whole of Great Britain, including Northern Ireland, will leave the European Customs Union, but there will not be a rigid border between Northern Ireland, which is part of the United Kingdom and the Republic of Ireland, i.e. Brexit, becomes incomplete for part of the United Kingdom;

3) financial implications:
   - a compromise methodology was agreed to calculate the financial obligations that London will have to accept after leaving the EU (the total amount is expected to be about 50 billion pounds sterling, but not as a one-time payment):
     - the UK has agreed to make regular payments to the EU general budget in 2019 and 2020, that is, until the end of the seven-year financial cycle of the EU;
     - the UK will also pay its share in the fund to support Turkey in the fight against migration, to the fund for Africa, as well as to the European Development Fund;
     - in turn, the EU will reimburse the UK: a British capital investment and a share in the European Central Bank and European investment banks.

Five possible options for trade relations with the European Union were considered.

1. The Norwegian option: the UK leaves the EU and joins the European Economic Area, which will provide it with access to the single European market, with the exception of part of the financial sector. It will also relieve the UK of EU rules on agriculture, fisheries, law and home affairs.

2. Switzerland: The UK will follow the example of Switzerland, which is not part of the EU or the EEA, but is part of Schengen and also concludes separate agreements with Brussels for each sector of the economy.
3. The UK may also try to conclude a comprehensive free trade agreement with the EU on the Swiss model, but with guarantees of access to the European financial market for the financial sector, as well as with some control over the implementation of common trade rules.

4. Turkish: The UK may enter into a customs union with the EU, which will give its industry free access to the European market, but the financial sector will not receive such access.

5. The UK can completely sever its relations with the EU and rely only on the World Trade Organization (WTO) rules.

The British are prone to the Norwegian or Swiss version of trade relations with the European Union. However, the European Union takes a tough stance. The recent history of relations between London and Brussels led the experts to the conclusion that “the era of the Eurocentric model of the world is nearing completion.” This largely explains the initial motives for the reorientation of British foreign policy from the EU to the US and the decision of London to leave the EU [8, p. 266].

The UK openly declares that it has “global foreign policy interests.” The country has a nuclear arsenal – in 2017, according to the Stockholm International Peace Research Institute (SIPRI), it was represented by 215 nuclear warheads. The UK can have the most powerful forces in relation to the countries of Western Europe with the armed forces (2% of GDP – for defense). Despite the fact that London fulfills military obligations to the allies, London pays for about 15% of all military operations conducted by European armed forces. In Britain, about a quarter of European defense spending [3, p. 6].

Building on real leverage in the world, such as nuclear status and veto power in the Security Council, the United Kingdom influences all key areas of the international agenda, including the application of international law to maintain international peace and security.

And if the restoration of its status, relying on the EU or a larger project than the EU, uniting the collective West, failed, then the UK does not lose hope for solving this task in the framework of the only alternative to White Hall – an alliance with the United States. In Brexit conditions, the preservation and development of transatlantic relations with Washington is important for London, more than ever the preservation of close transatlantic ties is considered as a key link in a survival strategy. London is also being promoted by increased signs of competition from Paris in rapprochement with Washington, France’s desire to seize London’s role as a global financial center, as well as attempts by the ruling French elite to undermine Britain’s ability to regain its global status.

However, the special nature of Anglo-American relations has always been more obvious to London than to Washington. Therefore, according to experts, the UK should have no illusions, and it is better to assess relations with the United States from a more sober position regarding their benefits for the UK. According to analysts, such a non-alternative application can be a profound delusion. Washington, which noted in its time in this respect the British Guardian, “does not attach importance to “special relations” when the position of the British contradicts their interests”.

Analysis of the impact of Brexit on the foreign policy vector of UK policy is possible only in terms of predicting likely scenarios.

First, the UK will retain full participation in a single domestic market in the Swiss model, that is, formally, London ceases to be part of the EU, while maintaining most of the existing ties. This scenario will limit the sovereignty of Great Britain and will require it to abide by the rules ensuring the freedom of movement of workers.

Secondly, the free trade regime with some elements of financial and investment cooperation can form the basis of relations between the European Union and the United Kingdom, thereby securing its position between Europe and the United States with sovereignty and special relations with Washington. Along with the US and the EU, the UK will be able to participate in the Transatlantic Trade and Investment Partnership (TTIP). Since this partnership minimally
hampers the economic sovereignty of the country, which does not imply a large regular load and liberalizes trade in goods and the movement of capital. The presence of the United Kingdom in the TTIP is attractive to all interested parties, as this will preserve transatlantic solidarity in the new agreements. Of course, this option is acceptable if the TTIP project itself is implemented, for which many political analysts have doubts.

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Opportunities and Challenges for Vietnam of Joining the ASEAN Economic Community

Annotation: this is an overview on the process of formation, objectives of the ASEAN Economic Community (AEC), the actions of Vietnam and ASEAN in implementing the AEC, analysis of the opportunities and challenges Vietnam joined the AEC. In terms of opportunities, Vietnam can have access to a broader good and service market. Vietnam have the opportunity to attract more foreign investment, especially from countries with higher level economic development such as Singapore and Indonesia and raise competitiveness of Vietnam’s exports. However, besides the opportunities, there are big challenges. Most of Vietnam’s enterprises are small not only in size but also in technology. When AEC was established in 2015, Vietnam’s enterprise face competition from imported goods and services, and investment from ASEAN countries. Some industries have to narrow production and even shut down.

Key words: ASEAN Economic Community, AEC, Vietnam.
JEL classification: A140.

About the ASEAN Economic Community (AEC)
The Association of Southeast Asian Nations (ASEAN) was established in 1967, currently consists of 10 countries: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam. ASEAN is based on three main pillars: political security; economy; sociocultural. Practical experience from the financial crisis East Asia in 1997–1998, in addition to the emergence of Chinese and Indian economies, made ASEAN countries determined to create a stronger, coherent economic cooperation community. Summit of ASEAN Association in 1997 in Kuala Lumpur, Malaysia issued a Statement of ASEAN Vision 2020 with the idea of turning ASEAN into a stable, integrated and competitive region, establishing a regional economic community by 2020. In 2003, the Summit ASEAN in Bali has decided to accelerate the process of forming the ASEAN Economic Community (Asean Economic Community – AEC), instead of the period of 2020, the countries decided decided to hasten the establishment of the AEC by the end of 2015. In 2007 adopted the AEC Plan 2007 set clear deadlines for ASEAN Member States to form the AEC, with the aim of consolidating Member States into a common economic community on December 31, 2015 [5]. Not like EU, ASEAN do not create central management organizations such as the European Union Commission or the European Central Bank that will focus on eliminating barriers to business and trade.

The AEC plan consists of 04 pillars (04 key contents): creating a unified market and production base; create a highly competitive economic sector; promote equitable economic development; build a fully integrated area with the global economy. In short, the AEC will turn ASEAN into a region with freedom of movement goods, services, investment, skilled labor and free flow of capital.
Regarding the creation of a unified market and production base, ASEAN member states are focusing on reducing and moving towards removing barriers to ensure the flow of goods and services and return capital. should be free among ASEAN countries. For the financial services sector, member states are committed to strong liberalization, eliminate restrictions in the banking, insurance and capital markets by 2015. This includes liberalizing four modes of cross-border trade in services as defined in the WTO – supply cross-border trade in services, consumption abroad, commercial presence and personal freedom.

**Action of Vietnam & ASEAN to implement AEC integration**

Currently, in ASEAN, Vietnam is considered as one of four members members with the best completion rate of AEC commitments. Vietnam has participated in comprehensive cooperation with ASEAN countries from traditional fields such as trade in goods, services, investment, agriculture, transportation, telecommunications, to new areas such as intellectual property protection, competition policy, consumer protection... So far, Vietnam has reduced import tax for more than 10,000 tariff lines to 0–5% according to ATIGA, accounting for about 98% of the tariff lines in the tariff table.

In terms of trade in goods, ASEAN has amended and supplemented economic agreements, in which the ASEAN Trade in Goods Agreement (ATIGA) was signed on February 26, 2009 in Thailand. The Protocol on amending a number of ASEAN Economic Agreements concerning trade in goods was signed on March 8, 2013 during the 19th AEM Retreat Conference in Hanoi. Countries are also in the process of discussing issues of non-tariff barriers in ASEAN and seven member countries (including Brunei, Indonesia, Malaysia, the Philippines, Singapore, Thailand and Vietnam) that have successfully connected connectivity. ASW port in ASEAN single window customs mechanism [3].

In terms of trade in services, ASEAN has agreed to help parties complete the necessary procedures for the ASEAN Agreement on the movement of natural persons into effect, on the basis of facilitating the movement of fish. People participate in regional trade in goods, trade in services and investment. Besides, the implementation of the ASEAN Tourism Strategy Plan 2011–2015 is also being actively implemented in order to facilitate the movement of tourism people through mutual recognition agreements.

In terms of investment, ASEAN is in the process of implementing the ACIA Agreement, in which the process of mutual review has been implemented to oversee the elimination of restrictions/obstacles or improve measures under the Master Plan. on developing the AEC to promote ASEAN into a united area of investment attraction.

In terms of intellectual property rights, the implementation of the work plan with 28 strategic initiatives and objectives in the 2012–2015 IPR ASEAN Action Plan has helped to improve the legality and policy in addressing issues. related to intellectual property [4].

1. **The Opportunities for Vietnam**
   - **Opportunity to have a broader market**

ASEAN has a total GDP of over 2.7 trillion USD, an average growth of 5% –6% annually. The population is over 600 million people, with a relatively young population structure. Per capita income is over 4,500 USD/person/year. The AEC with liberalization of goods and services movement in the ASEAN region will encourage greater regional business and investment activities. Increasing direct foreign investment and economic activity in the region will naturally bring about an increase in insurance demand in Southeast Asia. Vietnamese enterprises will invest more in production and business activities and services in other countries in ASEAN region... This is a good opportunity for Vietnamese enterprises to seize opportunities to expand the market. On the other hand, the AEC creates a unified market and production area, helps economies of many countries becoming more prosperous, leading to an increase in income and a new generation of middle-income consumers with high income – also a very potential customer of businesses [10].

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Opportunities for export expansion

When participating in the AEC, the export market for Vietnam’s goods will continue to expand. In addition, Vietnam will have the opportunity to attract more foreign investment, especially from countries with higher developed economies such as Singapore, Indonesia...

The most important thing is that the extensive participation in the AEC will help Vietnam to improve the domestic economic reforms according to the standards of integration, helping the Vietnamese economy to develop more effectively, thereby gradually overcome challenges.

AEC helps export growth. ASEAN is Vietnam’s leading trading partner and a driving force for our economy to maintain growth and export for many years, surpassing both the EU, Japan, China or the United States. With the advantage of being a dynamic, close geographical area, trade relations between Vietnam and ASEAN have high growth rates.

The open opportunity shows that when the AEC comes into operation, it will create a single market, maximizing the Free Trade Agreement (FTA), the tariff of goods circulation among countries in the region is gradually reduced to 0% [8].

When the AEC was formed, Vietnamese businesses could sell their goods to ASEAN countries almost in domestic. This is one of the advantages for goods circulation of businesses. Moreover, the import and export procedures will be less cumbersome and the reform of origin procedures, towards allowing enterprises to self-certify origin will also create favorable conditions for enterprises to clear goods to other countries in ASEAN market.

Opportunity to improve competitiveness for Vietnamese exports

When the AEC was established, Vietnamese businesses had a wider market. In addition, when the tax rate in ASEAN drops to 0%, Vietnamese enterprises have conditions to reduce costs, lower export prices, and contribute to increasing competitiveness. According to ASEAN regulations, 40% “internal” production products are considered ASEAN products, which will enjoy preferential treatment when exporting to ASEAN regional markets with FTA [7]. This is also an opportunity for Vietnam to take advantage of incentives to increase the competitiveness of domestic export goods to the regional market.

In addition, participating in ASEAN economic cooperation creates opportunities for businesses to improve their competitiveness; create opportunities for Vietnam to continue to change its export structure in the direction of increasing value added (from exporting raw materials to high quality products); improve the capacity and efficiency of Vietnam’s human resources.

Opportunities to attract investment sources

The most anticipated opportunity, from all ASEAN countries and not only Vietnam, is the investment and cooperation from large, developed economies. Because connecting and building a unified, less fragmented ASEAN will make big investors look at ASEAN as a common playground, a common workshop, there is a unified resource block, especially skilled human resources with relatively cheap prices [1].

The AEC has also helped Vietnam better improve its business environment from customs procedures and administrative procedures to creating more balanced investment incentives. Attracting more investment means a faster and more active technology transfer process, contributing to improving the quality of industrial products, creating momentum for Vietnam’s industry to develop in balance with other industries in other countries.

2. The challenges for Vietnam

One of Vietnam’s biggest challenges when participating in the AEC is the disparity in development level compared to the ASEAN-6 countries, reflected in both the size of the economy, businesses, qualifications. science and technology, labor skills... The time when the ASEAN community began to take effect in 2015, Vietnamese enterprises have faced competitive pressures from imported goods, products and services. and investment by ASEAN countries,
especially when ASEAN countries eliminate non-tariff barriers. Some industries had to narrow production, even close [6].

Secondly, the problem of low labor productivity in Vietnam is one of Vietnam's challenges. According to ILO's labor productivity report, Vietnam's labor productivity is highest in the Asia-Pacific region of APEC, Compared with other ASEAN countries, the average productivity of Vietnamese workers is low. less than half of the Philippines, 2 Thai and Mailaysia workers are equal to 5 Vietnamese workers, 1 Singapore worker is equal to 15 Vietnamese workers. So we can imagine how low the quality of Vietnamese labor is today. Often low productivity goes hand in hand with low wages, so many people think that is the advantage of the latter. But the reality is not so simple. Salary is only attractive when it is lower than real productivity (meaning that the employer will pay the advantage when he pays wages). However, the living standard in Vietnam is becoming more and more expensive today, making wages rise faster than productivity, eroding the advantage of cheap labor in the region.

In addition, the risk of the economy based solely on cheap labor and low productivity is very high. Because low quality labor is synonymous with a variety of skills, creativity and organizational effectiveness. With these characteristics, Vietnam will not be an attractive destination for pioneering investment projects in technology or scale. And this will be the reason for the separation of Vietnam (and other latecomers) further from countries that have a better foundation in ASEAN (such as Malaysia, Thailand or Indonesia) [2].

Low labor productivity is just one example of how risk can overwhelm opportunities. Meanwhile, we still have many weaknesses in the business environment, legal system, government quality, economic structure, vocational education...

Thirdly, the competition is getting fiercer and fiercer for Vietnamese enterprises. With the promotion of internal trade liberalization, tariff and non-tariff barriers between AEC member countries will be gradually eliminated. As of July 2018, Vietnam has reduced import duties for more than 10,000 tariff lines to 0–5% under ATIGA, accounting for about 98% of the tariff lines in the tariff. With such a deep tax reduction, in the future, goods of ASEAN countries will flood Vietnam market, leading to the improvement of Vietnam's trade deficit with ASEAN countries [9].

Vietnam’s export products will face competition from goods from other countries in the ASEAN market formed by AEC to create a common market, no longer barriers to goods, services and capital...

Trade facilitation in the AEC will also create competition for imported goods for products, industries or manufacturing and business sectors in the Vietnamese market. When Vietnam implements a commitment to reduce tariffs on products imported from partner countries where Vietnam and ASEAN have signed the Trade Agreement, Vietnamese goods will face competition from imported goods. Export from these partner countries. When an economy has not been adequately prepared before its competitors in the face of early removal of tariff barriers, it will lead to economic losses in the unequal competition, while also putting pressure on Vietnam’s nascent industry.

**Conclusion**

The decision to join ASEAN is a right strategic step, bringing important and practical benefits to Vietnam. This is an important milestone, the first breakthrough in the process of international integration of Vietnam, contributing to implementing the policy of proactive and active international integration, including the international economic integration of the Party. and government.

However, opportunities always go hand in hand with great challenges such as tougher competition not only competing for products and markets but also competing for high quality human resources. That requires businesses to actively seize opportunities, actively change production technology, apply advanced technology to create products. Products with good
quality and reasonable price can compete in the market. To this end, the Government needs to have specific policies such as preferential credit policies so that businesses can access loans, thereby investing in improving infrastructure, machinery and equipment, create high quality human resources. Vietnam needs to step up administrative reforms in the fields of trade, services and investment in order to improve the competitiveness of the economy as well as implement mechanisms for liberalization of the ASEAN common market.

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Vietnam — Russian Federation Relations in the Context of Strengthening US Presence in the Asia-Pacific Region

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**Annotation:** this article presents an overview of the Vietnam-Russia relationship with its well-known traditional friendship, respect, deep trust and mutual assistance that have been established in decades. This tie has overcome many challenges and is reaching new heights nowadays. The author also analyzes the relevant issues of Russian-Vietnamese cooperation in a troubled world. Especially this paper emphasizes on strategies taken by the Governments in the context of American enhances its influence and presence at Asia-Pacific Region.

**Key words:** Asia-Pacific region, Vietnam, Russia Federation, United States, China, economy, policy, military cooperation, weapon.

**JEL classification:** A140.

1. America’s Asia-Pacific Return

Over the past two decades, Asia-Pacific continues to be the most dynamic region in the world [2]. Some countries in the region (China, India, Russia…) have become the new, powerful economic and military center in the world. China has become the second largest economy in the world and is gradually shifting its strategic focus from «territorial defense» to «protecting interests», from «hiding and waiting for time» to «rising», increase military costs, build strong military forces with the desire to enhance their international status.

China’s global strategy is to protect the economic interests, political and cultural influence in the world, creating favorable conditions to become the most influential nation in the world development process in the world. 21st century. China considers Asia-Pacific as the number one priority in its strategy. Although China has achieved economic development achievements, along with its success in enhancing its political and military roles in the international arena, it also has many weaknesses and sensitivities. China will depend much on energy, food, raw materials, …from outside. If the supply of raw materials, food and energy becomes unstable, China will fall into a state of instability [11].

The rise of China has caused this region to become competitive and cooperative. In this area, the political-military security system relies heavily on agreements such as the Security Treaty Between the United States and Japan, the Mutual Defense Treaty Between the United States and the Republic of Korea, the ANZUS Treaty (among Australia, New Zealand, England, Malaysia and Singapore). Therefore, regional organizations tend to combine economic benefits with sovereign security. Asia-Pacific currently has «hot spots» in the Taiwan Strait, Northeast Asia, South China
Sea, Malacca Strait [1] ...This area also has other potential conflicts such as territorial disputes, ethnic and religious conflicts, unstable internal political situation, terrorism, piracy, illegal smuggling of weapons, drugs and immigrants. In the context of many complexities, many Asia-Pacific countries are focusing on modernizing the military and strengthening defense power.

Recognizing the economic importance of the Western Pacific and Indian Ocean regions, the United States shifted its strategic focus to Asia – a move that is seen as a counterbalance to the growing military and economic power of China. Accordingly, the US implements diplomatic tools, including high-level visits of staff, development experts, interdisciplinary delegations, to all countries. On the one hand, the United States has strengthened its traditional security alliance relations with Japan, South Korea, Australia, Thailand and the Philippines; provide flexible and adaptive linking strategies to cope with new challenges as well as take advantage of new opportunities; secure security and information infrastructure to prevent any provocation. On the other hand, the US also strengthened its relations with emerging countries like China, India, Indonesia, Singapore, New Zealand, Malaysia, Mongolia, Vietnam, Brunei and Pacific island nations. In addition, the US strengthens its participation in regional institutions to deal with transnational challenges, through regional structures, to strengthen the rule of law and protect intellectual property rights. The United States also strives to create and launch a number of «multilateral» forums such as Lower Mekong Initiatiie (LMI) and the Pacific Islands Forum (PIF).

In the economic field, the US has expanded trade and investment relations with Asia-Pacific region. The United States continue to use APEC, G20 and bilateral relations to promote trade liberalization, open markets, reduce trade barriers, enhance transparency and implement fair trade commitments.

In summary, Asia-Pacific region is becoming an increasingly active region, attracting the attention of many major countries. The strengthening of US presence in the region will create both opportunities and challenges for Vietnam in international relations in general, with the Russian Federation in particular.

2. Vietnam – Russian Federation Relations in the context of America’s strengthening presence in Asia-Pacific

First of all, it must be affirmed that the relationship between Vietnam and the Russian Federation is a long-standing traditional relationship, a reliable partner and mutual understanding. In the 1990s, due to various reasons, the relationship between the two countries was significantly reduced. However, since the 2000s, relations between the two countries have been gradually restored and developed. The event of extremely important significance in bilateral relations was President Putin’s official visit in March 2001. At this visit, the leaders of the two countries signed many important agreements, which affirmed that The two countries set up strategic partnerships. Then, in November 2006, during Mr. Putin’s second visit to Vietnam, the two sides considered to reevaluate the relationship between the two countries and the leaders of the two countries made annual priorities for implementation. Effective strategic partnerships have been signed to further promote this relationship [5].

Nearly two decades have passed since the two sides signed the Joint Declaration on Strategic Partnership, the cooperative relations between the two countries have grown strongly on all sides. The Russian-Vietnamese strategic partnership is based on a truly reliable and historically confirmed basis, in which economic, political, and defense relations are particularly valued.

Regarding trade relations, Consul General of the Russian Federation in Ho Chi Minh City Alexey Popov said that the relationship between Russia and Vietnam has improved markedly in the fields of economy – trade, technology, defense and education. Two-way trade turnover is reaching a record 5.2 billion USD in 2017 and the two countries are making efforts to reach 10 billion USD by 2020.
According to Popov, in the first 10 months of 2018, goods exchange has increased by 23% compared to 2017, reaching nearly 4.8 billion USD. The Russian Consul General said that these figures are extremely positive and that the task of achieving the US $ 10 billion milestone by 2020 is entirely feasible.

In addition to traditional areas of cooperation such as energy, mechanics and agriculture, Consul General Popov said that the two countries are beginning to promote cooperation in new areas, especially technology, including work applying Russian technology in building metro line 2 (Tan Tao – Long Thanh Airport) in Ho Chi Minh City.

The two sides are also actively preparing to build in Vietnam The Center for Atomic Science and Technology, and a series of wind power projects in Vietnam will be using turbines made in Russia.

Tourism continues to be a highlight in trade relations between the two countries, only in the first 10 months of 2018, Vietnam welcomed more than 550 thousand Russian tourists, an increase of 25% compared to 2017 [3].

The Consul General also stated that the process of direct contact between Russian localities and Vietnamese provinces has been raised to a new height in 2018. During the visit to the Russian Federation by General Secretary Nguyen Phu Trong, expanding oil and gas cooperation in the continental shelf of Vietnam is a content agreed by the two countries. “Both sides applauded and highly appreciated the implementation of joint projects in the field of oil and gas, affirming to continue creating favorable conditions for Vietnamese and Russian enterprises to expand their operations in the field in the territory of both nations”, according to the general statement of 5th September 2018 [13].

Military cooperation between Russia and Vietnam is growing. Although Vietnam is developing multilateral technical-military cooperation, buying weapons and equipment from the US and other countries such as Israel and South Korea, Russia is still a traditional partner in this field. The link between military leaders of the two countries is also maintained and developed.

In addition to military equipment manufactured by the Soviet Union, carefully maintained in the state of combat readiness, the Vietnam People’s Army also has modern Russian weapons, procured after the 1990 period, currently is the core of Vietnam’s combat force.

The Vietnam Air Force currently owns the Su-30MK2 multi-purpose fighter aircraft, the anti-aircraft force is also serviced by the advanced S-300PMU-1 anti-aircraft missile systems [8].

In the plan to modernize armored forces, Vietnam once again selected Russia as its supply partner, with T-90MS main battle tanks proving strength on the Syrian battlefield [9].

The backbone of the Vietnamese Navy is a Russian surface warship such as the Gepard 3.9 class defense ship and dozens of Molniya missile ships produced at Vietnamese shipyards under license from Russia, as well as ships underground diesel-electric belonging to the Varshavyanka class (NATO identifies as Kilo) [4; 11]; Coast guard forces are also on the payroll system of the world’s leading flagship missile K-300P Bastion-P.

Vietnam also owns many Russian personal guns and can manufacture those guns (for example, with a production license from Russia, Vietnam produced its own large-scale sniper rifle OSV-96, also like modernizing Kalashnikov assault rifles).

In addition, the current and future officers of the Vietnam People’s Army are still studying at Russian military schools, to improve the level of combat as well as the level of technical mastery of the different types of modern Russian weapons [14].

In the new regional and international context, especially with the strengthening of US presence in the Asia-Pacific region, China is emerging as a regional and world power. This will undoubtedly impact international relations in the region including Vietnam – Russian Federation relations. There are many signs that Russia and China are more strongly linked, raising the cooperation to counterbalance the US in many international issues, as evidenced by the visits of senior leaders. and many recent military exercises between the two countries. In addition, the recent situations in Egypt, Libya, Iran, Syria, Venezuela and NATO’s “humanitarian
interventions” in the conflicts have made China and Russia tighten diplomatic relations, to defend themselves against NATO’s unilateral policy led by the United States. Both countries share a number of perspectives on international affairs, advocating not to interfere with the internal affairs of sovereign states.

In the context of EU expansion to the east, Russia and China signed a memorandum of understanding to strengthen security cooperation between Shanghai Cooperation Organization (SCO) and Collective Security Treaty (CSTO), creating a broad coalition of military security cooperation covering most CIS countries and China.

At the same time, when the US focused more on Asia, Russia could not lose its Asian partners to the United States. This has just affected the economy (Russia’s market expansion), while affecting Russia’s security as the US has clamped down on both its East and West. Therefore, Russia is also showing that the Russian navy will return to the Pacific more strongly in the future and reaffirm its position. Russia also does not want to lose contracts to provide arms to its partners in the region in the hands of the United States and Europe, when the Russian arms market is shrinking. If conflict occurs in the South China Sea, Russia will not take sides, but Russia will find ways to bring peace and stability in the South China Sea.

Obviously, in the new context of the Asia-Pacific region, Russia needs to expand its relations with the region. The maintenance of foreign policy towards East-West equilibrium has been confirmed right away from President Putin’s first term will continue to be implemented. Moreover, for Russia, seeking to re-position its international status as a great power, it is certain that developing relations with the Asia-Pacific region will be very important. In this context, Vietnam–Russia relations will have many opportunities to develop. Firstly, Vietnam and Russia have longstanding traditional relationships, trust and mutual understanding. This relationship has now been confirmed as a strategic partnership. Secondly, potentials and strengths in all aspects, especially in the economy between the two countries, and many areas can continue to exploit. Thirdly, Vietnam with an important geostrategic position of the region, a member of ASEAN, will be an important bridge in expanding Russia’s relations and influence in the region.

**Prospects of Vietnam – Russia relations**

Russia is an Eurasian country with long-term military, political and economic benefits in the Asia-Pacific region. Russia’s economic interests in the Asia-Pacific region have great potential, especially now Russia is eager to rapidly develop its eastern territorial economy. This area has huge natural resources, capable of economic development with great speed. Russia has now set its own policy for the development of the Far East, ensuring its sovereignty and territorial integrity.

Russia strives to find opportunities to establish new relations with Japan, stabilize its neighborly relations with China and develop a comprehensive relationship with the Koreas and countries in the Asia-Pacific region, especially with ASEAN and India.

Clearly, Russia has succeeded in raising its status in Asia in recent years. Their relationship with China and India was very tight, while relations with Iran and the DPRK remained stable, despite all the fluctuations surrounding the two countries. Russia has participated in the East Asia Summit – the most important conference to discuss multinational security institutions in this region. Russian representatives also often participated in meetings and dialogues of ASEAN Defense Ministers’ Meeting, Asian Cooperation Dialogue, and important regional conferences where they had previously been absent. In the South China Sea, although Russia opposes a third country’s intervention in the region, Russia still has a need for freedom of navigation in the South China Sea, which also benefits oil and gas exploitation here with Southeast Asia countries. Russia is also a leading supplier of weapons in this region, so the country cannot stand to see its benefits and status compromised.

Due to the demand for benefits as well as the strength, the level of cooperation and restraint between Russia and the US for China is completely different. The United States increased its
presence in the Asia-Pacific region in general, Southeast Asia in particular in order to assert its superpower as well as to contain China and protect American interests. Meanwhile, Russia has increased economic cooperation, being cautious in defense cooperation as well as sensitive issues in the region. With such strategies, both Russia and the US have moves to increase relations with Vietnam and ASEAN.

In such context and impact factors, the prospect of relations between Vietnam and the Russian Federation clearly has both opportunities and challenges. However, there are many grounds to confirm the prospects for a good development of Vietnam-Russia relations in the future:

Firstly, the Vietnam-Russia relationship is a strategic, trusting partnership, while Much potential can be exploited. In terms of geopolitical position, economic geography, although Russia and Vietnam are not close to each other, in general, both sides have many strengths that can be used in each other. The potential and strength of both sides can complement each other very well. Russia is a country rich in resources, with modern science and technology, especially those related to national defense and security. Trust and mutual understanding will enable the two sides to strengthen cooperation in many ways.

Secondly, Russia’s economic development achievements from the early 2000s will enable Russia to step by step seek its international status as a powerhouse. In order to achieve that strategic goal, Russia cannot help but exclude the Asia-Pacific region in general and Southeast Asia in particular. Vietnam as a member of ASEAN, with its potentials and strengths, especially its relations with Russia will be an important bridge for Russia in its relations with the region.

Thirdly, Vietnam and Russia have long-standing traditional relationships, mutual understanding and trust. Historically, relations between the two countries have developed very well. Currently the Vietnamese community in the Russian Federation is quite large, they are working in many different fields, this community is an important strength in strengthening the development of the current and future bilateral relations.

The official visit to the Russian Federation of General Secretary of the Communist Party of Vietnam Nguyen Phu Trong from September 5 to 8, 2018 confirmed that the comprehensive strategic partnership between the two countries will continue to be promoted. “The two leaders emphasised the significance of the thorough preparation of activities for the Vietnam Year in Russia and the Russia Year in Vietnam, taking place in 2019, which are hoped to contribute to promoting bilateral cooperation across many sectors. The two sides expressed their satisfaction with the development of defence-security and military cooperation, the field that holds a special role in the Vietnam-Russia relationship, while affirming their determination to consolidate and expand ties in these fields in the spirit of a comprehensive strategic partnership, on the basis of international law and laws of each country” [13].

It is clear that in the international and regional context there are many changes, especially the strengthening of US presence in Asia, Vietnam-Russia relations have very good development prospects. However, for the two countries ‘relations to develop really strong, commensurate with the potential and requirements of both sides, there must be high political determination of the two sides’ leaders and appropriate mechanisms and solutions.

Conclusion

The return of Asia to the United States has made the context of the Asia-Pacific region change drastically. It seems that the geopolitical position of Vietnam is raised when many world powers want and are willing to cooperate more closely with Vietnam. This makes it difficult for Russia to ignore. In fact, Vietnam – Russia relations have a good development foundation and are strongly promoted by the two states. Despite the establishment of a strategic partner, the relationship between Vietnam and Russia is still limited, not worthy of the potential and strength of the two countries. In the context of America’s return to Asia, opportunities for cooperation with the US will be more and at the same time promote Vietnam to further strengthen relations with Russia. In order to promote Vietnam-Russia relations, the two sides need to well implement
the agreed orientations between the leaders of the two countries, best promote the potentials and advantages of both sides in the changing international and regional contexts.

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2019 European Parliament Elections

Annotation: the article is devoted to the analysis of the upcoming elections to the European Parliament in May 2019. It examines the existing parties, the current balance of power in Parliament, Salvini’s activism, repositioning of Western European populists, consequences of Brexit and questions about Fidesz and ANO. Analyzed what the European Parliament will look like after the elections of May 26.

Key words: European Elections, European Parliament, Brexit, EFDD, ENF, ECR, Fidesz, ANO, EPP.

JEL classification: A140.

After meeting with Viktor Orban in Italy in August 2018, Matteo Salvini visited Poland in Warsaw on January 9, 2019, where he met with the leader of Poland’s ruling party Law and Justice (PiS) Jarosław Kaczyński. He said that Italy and Poland would be “the protagonists of this new European spring”. Hungarian Prime Minister Viktor Orban described the alliance between Italy and Poland as “one of the greatest developments that this year could have started with” [7]. Other columnists mention Salvini in the opposite way, as someone who is “flying blind up” [11] in his search for political alliances at the European level.

While Matteo Salvini met the PiS leaders, Luigi Di Maio – the figure of the other partner of the Italian government coalition, the Five Star Movement – met with Polish populist leader Paweł Kukiz to conclude an agreement for the next European elections. Shortly after that, Mr. Di Maio expressed his interest in associating with a possible political emanation of Yellow Vests in France [8].

If there is one subject on which almost all sides of the political spectrum in Europe seem to agree, it is importance of the European elections of May 2019. With a clash between two represented tendencies, one by French President Emmanuel Macron, the other by Hungarian Prime Minister Viktor Orban.

Macron and Orban did not fail to identify themselves as representatives of opposing camps: during his visit to Bratislava Macron described the Hungarian and Polish rulers as “crazy minds” who “lie to their people”, while Orban called Macron the leader of a “pro-migration camp” during his travel to Italy to meet Interior Minister Matteo Salvini in August.

In September 2018, when Orban had come to Strasbourg in person to speak about the Sargentini report against Hungary, he once again spoke about the time horizon of May 2019: “We Hungarians stand ready for the elections next May, when the people will finally have the chance to decide the future of Europe, and will have the opportunity to restore democracy to European politics” [16].

Even if the European Parliament is not the only governing body of the European Union and it is unlikely that the elections in May 2019 will lead to a radical change in the EU, its symbolic importance and its role in the institutions are not to be overlooked.
In January 2019 Viktor Orban reaffirmed his ambition that a majority, hostile to immigration, would emerge in every institution of the European Union. The first step is the European Parliament, then the European Commission and finally the European Council, as the national parliamentary elections would bring to power governments hostile to mass immigration.

The current balance of power and the foreseeable consequences of Brexit

Since the establishment of a European Parliament elected by universal suffrage in 1979, the two majority groups in Parliament are the EPP (European People's Party, Christian Democrats) and the Social Democrats, and usually they have a habit of constituting together a majority that shares the Presidency of Parliament at regular intervals.

This current balance of power gives an absolute majority (of 375 seats) to the EPP and the Social Democrats, that together constitute 404 of the 750 seats. One can also count the liberal deputies of the ALDE among the solid parts of the “pro-Brussels” majority.

![Figure 1. Distribution of 750 seats in Parliament](image)

More to the left, the Greens and GUE groups are globally pro-European and pro-immigration, some of the nuances or disagreements with the majority tendencies are related to environmental issues, economic free-trade (TTIP, CETA), even with the issue of EU-Russia relations with regard to the GUE/NGL group.

On the right of the EPP, there are 3 parliamentary groups:
– The European Conservatives and Reformists (ECR) group;
– The Europe of Freedom and Direct Democracy (EFDD) group;
– The Europe of Nations and Freedom (ENF) group.

A new caryall EFDD group with the Five Star Movement?

Brexit will dramatically change the situation for the groups to the right of the EPP. The future of the EFDD group is the most concerned with the departure of the British and the positioning instability of the Five Star Movement.

Until now, the EFDD group was essentially Nigel Farage’s instrument used as a platform to promote Brexit. The Italian Five Star Movement seems eager to retain the EFDD group that it was trying to leave in 2017. Due to its political weight, the Five Star Movement would inevitably take the leadership of this group.

Several allies have already been found to achieve this goal: in addition to the Polish Kukiz movement, the Five Star Movement claims to have reached agreements with the Croatian party i vi zid described as populist and the Finnish liberal party Liike Nyt [6].

As in the 2014–2019 term, the eventual future of the EFDD group led by the Five Star Movement will grant full voting freedom to its members, which should favor its ability to recruit free electrons to bring together the 7 nationalities needed for the constitution of a group.
The ENF group will also have to struggle for its survival

The ENF group currently has 8 nationalities. If it remained as it was, it would just have the required 7 nationalities after the withdrawal of the United Kingdom. But it is not certain that all its members will be re-elected or remaining in the ENF group. Other allies could however come in reinforcement, with for example the possible entry into the European Parliament of the Czech nationalist SPD party led by Tomio Okamura.

It is not impossible that the group does not manage to reconstitute itself because of the constraint of the number of nationalities to gather. Everything will depend on how parties such as the Italian Lega or the Austrian FP are going to position themselves: they have become during the 2014–2019 term governmental parties, which could make them more acceptable to potential partners who are essentially in the ECR group.

However, it is also unsure that the heavyweights of the ECR group have an interest in the fact that heavyweights like the French RN are totally left behind after the elections and find themselves without a parliamentary group, due to the unfailing support of these MEPs to the Polish or Hungarian governments when they have been attacked – vote on the basis of the article 7 – in the European Parliament in recent years.

The future of the ECR Group and the unlikely Eurosceptic common group

As for the ECR group, if it is not threatened with extinction consequently to the departure of the British Conservatives, it will nevertheless be weakened by the departure of the 19 British MEPs. In order to maintain its position as the third political force in the European Parliament, the ECR group will therefore have to expand to new partners, especially as the ALDE group could be reinforced by the elected representatives of the French presidential party LREM which did not existed back in 2014.

The ECR group could be reinforced with the Debout la France party of Nicolas Dupont-Aignan, currently unrepresented in the European Parliament and previously associated with the EFDD of Nigel Farage, as the French politician has concluded an agreement with the ECR group [2].

Jan Zahradil, Czech MEP and “Spitzenkandidat” of the ECR Group for the European Commission, also mentioned the Italian Lega as potential new partner of the ECR group. But he seems to discard cooperation with the French National Rally or the German AfD, evoking in particular geopolitical differences of opinion between the partisans of Atlanticism and the Russophile parties [5].

If the question of Russia is partly relevant, especially for Poland, it cannot be the only argument, especially if one takes into account that the Russophile position of Matteo Salvini did not prevent him from being received in Warsaw. In reality, the Hungarian and Polish rulers seem to allow themselves to organize official meetings with leaders of political parties in Western Europe which are qualified as populists or eurosceptics as far as they are part of the ruling coalition government, and such a meeting can be presented as inter-governmental.

Conversely, although they remain loyal to their French partner of the RN with which they sit in the European Parliament within the ENF group until the end of the 2014–2019 term, the leaders of the Italian Lega and the Austrian FP have shown in recent months more interest in appearing with Orbán or Kaczyński. As evidence, one can consider the absence of great figures like Salvini or Strache at a European meeting organized by the RN in Nice on May 1, 2018.

Manfred Weber, appointed by the EPP to compete to the succession of Jean-Claude Juncker at the head of the European Commission, made it clear: he would look favorably on the Lega’s joining of the ECR, implying the abandonment of the ENF group with the RN party of Marine Le Pen [17].

And it seems that Salvini, behind a seeming dispersal attitude, wants actually to keep all doors open, since he maintains good relations with Marine Le Pen, that he welcomed in Italy in October to announce a “Freedom front” in view of the 2019 European elections.

Some voices, including those of Salvini or the German AfD, have expressed their wish to see the emergence of a common Eurosceptic group after 2019, that would bring together the forces
that can currently be found scattered among the groups ECR, EFDD and ENF. Such a group could exceed one hundred of MEPs [4].

The possibility of such a group is, however, low, particularly because of the impact it could have on some of these government-level parties at the national level to associate with certain formations considered too marginalized or marginalising.

Whether the prospect for the PiS to be in the same parliamentary group as the RN or Vlaams Belang does not seem to be on the agenda, Olivier Bault notes, however, that “an evolution is being felt within the PiS regarding the attitude towards the French national movement and Marine Le Pen” [12].

When the European Parliament votes against the Polish or Hungarian governments, both of the Central European countries have always been able to count on the support of the elected representatives of the ENF group, and they are seeking – without necessarily associating themselves politically with them – to maintain the cordiality in relations with these political parties [13].

We can therefore imagine two groups on the right of the EPP after 2019, with informal coordination between these groups, especially since most Euro-Critical parties have generally given up their desire to exit the EU or the common currency.

Questions about Hungarian Fidesz and Czech ANO

The continued presence of Fidesz within the EPP has been the subject of many debates and speculations for several months. Jean-Claude Juncker himself said that he believes Fidesz no longer has a place in the EPP, while Manfred Weber voted the Sargentini report against the Hungarian government [9].

The question is sometimes raised even in Hungary, like it was made publicly at the 2018 Summer University in Tusványos, where Viktor Orban gives a speech of general political analysis every year [14].

However, Fidesz is not totally isolated within the EPP and still enjoys strong support, such as that of its president Joseph Daul. During the vote on the Sargentini report, Fidesz could still rely on several reliable allies, such as Forza Italia’s elected representatives, or the ones of Croatian HDZ or Slovenian SDS [3].

As for Viktor Orbán, his communication on the subject is inflexible: there is no question for him to see Fidesz leave the EPP.

As for the EPP, despite the embarrassment of part of its ranks to keep Fidesz in its midst, the challenge is also to remain the majority group in the European Parliament. Despite Hungary’s low demographic weight in the EU, Fidesz’s electoral results mean that the Hungarian delegation of the EPP is, in numerical terms, the fifth one of the EPP.

However, the hypothesis of exclusion of Fidesz would imply the departure of a dozen of MEPs or other partners. That hypothesis would be damaging for the EPP, but also for Orbán’s strategy that seems to be to bring its partners on its line rather than to be marginalized on the European scene.

If Fidesz finds itself excluded and manages to bring with it its Hungarian minority allies, as well as other Italian, Croatian or Slovenian partners, then the EPP could have a smaller number of deputies than the social-democratic group.

In any case, it seems there will be no move from Fidesz or the EPP before the European election and the following steps.

The other question, which is more well-founded, is where the MEPS of the Czech government party ANO of Prime Minister Andrej Babi will sit. Indeed, they currently sit in the ALDE group led by Guy Verhofstadt. They voted in favor of the Sargentini report against the Hungarian government, which provoked the anger of Andrej Babi, who distinctly disassociated himself from the ANO MEPS’ vote, stating that they would no longer be elected in a year, feeling sorry for their vote but stating that their vote is their own decision [15].
It is hard to imagine that the new members of the ANO will sit again in the ALDE group during the next term of office. Due to the hostile positioning of their leader on migrant quotas and his solidarity with Orbán, one can imagine as an option that the new members of the ANO sit within the ECR group.

What about the left-wing populists of Central and Eastern Europe?

On the left, the presence in the group of Social Democrats of the Slovak SMER and the Romanian PSD sometimes raises questions, because of the “populist” orientation of the exercise of power of these two formations. In the past, the SMER has been heavily criticized for the past government alliances with nationalist right parties in Slovakia.

Talking about the global situation in Europe, the presidential candidate for the European Commission Manfred Weber doesn’t forget the Romanian Socialists of the PSD: “If I look at the European political landscape today I see Salvini in Italy, Kaczynski in Poland, the Romanian socialists, Orban. We could wish for something else, of course. But that’s the reality” [10].

If three of the four MEPs from the SMER were identified as reliable people by George Soros’s networks, it is clear that these people – apart from Boris Zala – did not systematically follow the instructions of their group on the votes relating to the situation in Hungary or Romania [1].

Figure 2. Slovak SMER MEPs’ votes during the vote on Hungary and Romania

Source: votewatch.eu.

The situation of the SMER and the PSD is similar to that of Fidesz with the EPP: despite some differences, nobody seems to be interested in a divorce that would weaken the social democratic group and marginalize the excluded.

If the situation of the SMER within the social-democratic group does not seem to give rise to any particular concern, it would be interesting to see how the situation will evolve with the elected representatives of the Romanian PSD while a first vote of the European Parliament took place against the Romanian government and that Romania has just taken the rotating presidency of the European Union.
Coordination beyond political groups?

It is therefore very unlikely that the coordination of the various oppositions to the European Union’s orientation could melt down into a single parliamentary group during the 2019–2024 parliamentary term.

Moreover, it is not certain that this would be beneficial to the reformist tendencies, since a EPP and a social-democratic group purged of their troublemakers would certainly be numerically somewhat weakened but could – with the liberal group ALDE – constitute a majority central bloc and do not suffer anymore from internal disputes.

Even with a possible populism`s surge, it is still likely that with the addition of the social-democratic groups, ALDE and EPP have a comfortable majority in the European Parliament, even if we were to cut parties like Fidesz or the PSD.

Unless hard-to-control political phenomena such as the Five Star Movement in Italy or the movement of Yellow Vests in France emerge elsewhere in Europe and contribute to the weakening of traditional majorities.

Unless the current balances are upset, the path of reform may occasionally take shape through coordinations that go beyond the cleavage of political groups or even national political traditions. In this regard, the rejection of the report against the Romanian government by Fidesz MEPs constitutes a model of political pragmatism. It should be noted, that many supporters of the line of PSD leader Dragnea criticized the PSD deputies’ vote against Hungary, and that it is conceivable that the new PSD Euro-parliamentarians will be more carefully selected, in order to match with the line of their party.

It is not to be excluded that the contempt of Westerners and Brussels for the rulers of Central and Eastern Europe is the best way to bring them to strengthen their solidarity and political identity beyond the V4, all with the support of Western populists who praise their governance.

References
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REFERENCE TO ARTICLE

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The Content of Heavy Metals (HM) in the Main and By-Products of the Main Agricultural Plants Cultivated in the Central Federal District of the Russian Federation

Annotation: the article assesses agricultural plants on the content of heavy metals, shows the role of roots in the protection of aboveground and reproductive organs from the penetration of heavy metals; the work expands the understanding of the chemical composition of plants; its results can be used in environmental monitoring.

Key words: heavy metals, chemical composition of plants, environmental protection, biogeochemical cycles, food chains.

JEL classification: J190, J280.
Introduction

Intensive industrial and agricultural use of natural resources has caused significant changes in the cycles of most chemical elements, including heavy metals (HM), which are among the most common and dangerous for living organisms environmental pollutants [2].

The study of pollution of the biosphere as a whole, as well as its individual components TM has become an integral part of the problems associated with environmental protection.

The literature presents data on the accumulation of heavy metals in different types of soils, their distribution in the soil cover and the profile of individual regions, the migration of heavy metals in the system ‘soil – plants’.

Of particular interest is the accumulation of heavy metals in living organisms, especially in plants that serve or can serve as food for animals and humans [4]. Performing the role of producers in the food chain, in which man is embedded, agricultural plants are the first accumulators of heavy metals [5; 6]. According to the classification of mineral substances, based on criteria of physiological functions, all the mineral elements are divided into four groups: the main components of organic substances, osmotically active elements, which determine the permeability of the membranes, the elements included in the enzyme system, the elements that are toxic to higher plants.

A significant part of the elements in this classification belongs to the category of trace elements, including heavy metals [6].

The literature provides a lot of data on the ability of agricultural plants to absorb and accumulate heavy metals, which undoubtedly affects the quality of crop production.

The assimilation of heavy metals varies greatly depending on the species characteristics of plants, for example, a high coefficient of biological absorption of Cu was observed in plants of the family of cloves, Co – peppers, Zn – birch dwarf, lichens, Ni – lichens. Among agricultural plants, fodder beet and legumes are particularly prone to accumulation of heavy metals.

Agricultural crops on the ability of accumulation of heavy metals in their products are arranged in descending order as follows: fodder beet > table beet > carrot > cabbage > corn silage > potatoes > barley grain > oats grain [15].

Toxic effects of heavy metals are more pronounced in the early stages of plant development. Admission to the plant and migration of heavy metals through the plant occurs mainly in the form of complex compounds. The content of heavy metals in roots and seeds in conditions of severe pollution may differ by 500–600 times, which indicates significant protective capabilities of the root [7; 8; 22].

Elements on the basis of bioaccumulation by plants are ordered as follows:

* Cd, Cs, Rb – intensive absorption;
* Zn, Mo, Cu, Pb, As, Co – average absorption;
* Mn, Ni, Cr – weak absorption;
* Se, Fe, VA, Te – hard to reach for plants [5; 9].

The ability of plants to concentrate elements there are two types of phytoconcentrates:

* plants concentrating many elements;
* plants with selective concentration.

Plants of the first type are enriched with elements under the condition of their increased content in the soil, plants of the second type absorb the concentrated element regardless of its amount in the soil [7].

There are also barrier (non-concentrating) mechanism of absorption of heavy metals from the soil into plants, which is characteristic of higher plants, and barrier-free (concentrating) mechanism, characteristic of mossy and lichen.

The influence of a number of heavy metals on plants is presented in table 1 [7; 9].

Also important is the organ of the plant, in which there is a concentration of heavy metals. Wheat accumulates in vegetating organs 20–40 times less lead and 20 times less cadmium than
in the roots; for copper and zinc there is such a pattern in the distribution: roots>grain>straw, but for lead, cadmium and strontium is characterized by the following distribution: roots>straw>grain [9].

It is assumed that a significant role in this process is played by the Kaspari belt, which delays the transfer of heavy metals from roots to leaves.

In terms of toxicity, heavy metals are arranged in the following descending order: mercury > copper > lead > cadmium > chromium > zinc > Nickel > aluminum [4; 12].

The effect of heavy metals on plant yield and its quality is classified into:
* tolerant – not leading to adverse effects on the plant;
* sublethal – reduction of the crop of vegetative or reproductive part by no more than 10%;
* lethal – leading to partial or complete plant death, but not exceeding MAC in plant products;
* critical – leading to excess MPC in plant products [17].

**Table 1**

<table>
<thead>
<tr>
<th>Element</th>
<th>Concentration in soil, mg / kg</th>
<th>Plant reaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zn</td>
<td>140–250</td>
<td>Chlorosis of young leaves</td>
</tr>
<tr>
<td>Cd</td>
<td>1–13</td>
<td>Violation of enzyme activity, processes of transpiration and fixation of CO2, slowing down the process of photosynthesis, inhibition of biological recovery of NO2 to NO, an obstacle to the receipt of a number of nutrients and metabolic disorders. Growth retardation, root damage, leaf chlorosis</td>
</tr>
<tr>
<td>Pb</td>
<td>100–500</td>
<td>Inhibition of respiration and inhibition of photosynthesis process, sometimes increase Cd content and decrease in intake of Zn, Ca, P, S, decrease in yield, deterioration of crop production quality. Stunting of the foliage, the appearance is dark green and Curling of older leaves</td>
</tr>
<tr>
<td>Ni</td>
<td>30–100</td>
<td>Oppression of the processes of transpiration and photosynthesis, a manifestation of chlorosis</td>
</tr>
<tr>
<td>Cr</td>
<td>200–500</td>
<td>Deterioration of plant growth and development, withering of the above-ground part, damage to the root system, chlorosis of young leaves, a sharp decrease in the content of macro – and microelements in plants (K, P, Fe, Mn, Cu, B, etc.).</td>
</tr>
</tbody>
</table>

Sensitivity of agricultural plants to heavy metals is characterized by the appearance of necrosis, chlorosis, inhibition of growth. The most sensitive to cadmium, lead, zinc and copper clover ordinary, excess copper react legumes, cereals, spinach and gladiolus, zinc – cereals and spinach, cadmium – legumes, roots, oats and spinach. The reaction to lead is noted in beets, carrots, turnips, peas, alfalfa, and to its excess relatively tolerant cereals, corn and cucumber. High resistance to cadmium was noted in turnips, radishes, lettuce.

The extent of pollution of soil, production of crops and livestock to heavy metals induce the necessity of theoretical studies for obtaining normalized on certain chemical elements in agricultural production. First of all, this applies to such elements-xenobiotics as heavy metals.

The aim of the study was to study the limits of variation, migration and accumulation of heavy metals in agricultural plants of Moscow, Tver and Yaroslavl regions.

The objectives of the research are to assess the tolerance of plants and to determine the selectivity of their absorption of heavy metals, to study the size of their receipt depending on the anthropogenic load on the soil.

The subject of research is the content of trace elements in plants grown under different anthropogenic load.
Methods

We used both General scientific methods of cognition (synthesis, statistical, generalization) and empirical-theoretical (data collection, study and analysis). As a theoretical basis, the works of domestic and foreign scientists—biologists, ecologists, soil scientists, agrochemists and hygienists, legal acts regulating the quality of the environment, scientific publications in periodicals and works posted on the Internet, as well as materials of scientific conferences, congresses and forums were used. The information and statistical base of the study is presented by the reporting data of the Ministry of natural resources and ecology of the Russian Federation, the Ministry of agriculture of the Russian Federation, as well as the Federal state statistics service. The study of the elemental composition of natural objects (the content of trace elements and heavy metals) in the Central Federal district of the Russian Federation was carried out on the example of several districts of the Yaroslavl region (Nekrasov, Ugлич, Ярославль) in the period 2016–2018.

Results

Improving crop productivity in the current environmental conditions should be inextricably linked to quality control of agricultural products. As shown by our research, different types of agricultural plants differed significantly in the content of trace elements (table 2).

Table 2

Limits of variation and average content of trace elements in grain plants

<table>
<thead>
<tr>
<th>Production</th>
<th>Average yieldness, centner / hectare</th>
<th>Cu</th>
<th>Zn</th>
<th>Cd</th>
<th>Pb</th>
<th>Mn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter rye</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain</td>
<td>20.0-22.0</td>
<td>2.89-4.51</td>
<td>36.71-42.00</td>
<td>0.046-0.156</td>
<td>0.032-0.053</td>
<td>23.36-25.73</td>
</tr>
<tr>
<td></td>
<td>20.8</td>
<td>3.91</td>
<td>31.91</td>
<td>0.110</td>
<td>0.042</td>
<td>24.79</td>
</tr>
<tr>
<td>Straw</td>
<td>40.0-44.0</td>
<td>1.78-5.20</td>
<td>10.57-21.80</td>
<td>0.011-0.405</td>
<td>0.018-0.277</td>
<td>13.20-32.40</td>
</tr>
<tr>
<td></td>
<td>41.7</td>
<td>3.11</td>
<td>14.69</td>
<td>0.147</td>
<td>0.172</td>
<td>19.91</td>
</tr>
<tr>
<td>Spring wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain</td>
<td>12.0-23.1</td>
<td>1.56-13.20</td>
<td>1.79-41.32</td>
<td>0.006-0.229</td>
<td>0.025-0.361</td>
<td>13.8-57.8</td>
</tr>
<tr>
<td></td>
<td>17.9</td>
<td>4.34</td>
<td>25.18</td>
<td>0.038</td>
<td>0.076</td>
<td>39.14</td>
</tr>
<tr>
<td>Straw</td>
<td>14.4-27.7</td>
<td>1.48-7.30</td>
<td>2.09-28.83</td>
<td>0.004-0.425</td>
<td>0.014-0.208</td>
<td>14.93-63.10</td>
</tr>
<tr>
<td></td>
<td>21.6</td>
<td>3.55</td>
<td>10.28</td>
<td>0.039</td>
<td>0.095</td>
<td>34.26</td>
</tr>
<tr>
<td>Oat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain</td>
<td>8.0-21.0</td>
<td>3.20-9.4</td>
<td>9.60-32.65</td>
<td>0.007-0.157</td>
<td>0.029-0.235</td>
<td>20.86-35.6</td>
</tr>
<tr>
<td></td>
<td>16.33</td>
<td>5.96</td>
<td>22.98</td>
<td>0.057</td>
<td>0.143</td>
<td>30.19</td>
</tr>
<tr>
<td>Straw</td>
<td>8.8-23.1</td>
<td>3.56-18.6</td>
<td>9.36-35.2</td>
<td>0.005-0.496</td>
<td>0.015-0.185</td>
<td>24.3-34.88</td>
</tr>
<tr>
<td></td>
<td>18.0</td>
<td>8.59</td>
<td>19.82</td>
<td>0.169</td>
<td>0.118</td>
<td>28.16</td>
</tr>
<tr>
<td>Winter wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain</td>
<td>11.0-22.0</td>
<td>3.85-4.50</td>
<td>29.4-32.74</td>
<td>0.021-0.177</td>
<td>0.036-0.110</td>
<td>27.82-39.1</td>
</tr>
<tr>
<td></td>
<td>18.1</td>
<td>4.18</td>
<td>30.91</td>
<td>0.083</td>
<td>0.063</td>
<td>34.21</td>
</tr>
<tr>
<td>Straw</td>
<td>14.3-28.6</td>
<td>2.91-5.0</td>
<td>13.5-16.33</td>
<td>0.006-0.357</td>
<td>0.012-0.225</td>
<td>19.4-39.78</td>
</tr>
<tr>
<td></td>
<td>23.6</td>
<td>3.74</td>
<td>15.08</td>
<td>0.130</td>
<td>0.116</td>
<td>26.43</td>
</tr>
<tr>
<td>Grain</td>
<td>29.0-46.5</td>
<td>18.6-6.0</td>
<td>13.1-20.1</td>
<td>0.007-0.015</td>
<td>0.096-0.140</td>
<td>12.0-14.2</td>
</tr>
<tr>
<td></td>
<td>29.0</td>
<td>2.90</td>
<td>16.6</td>
<td>0.011</td>
<td>0.118</td>
<td>13.1</td>
</tr>
<tr>
<td>Straw</td>
<td>40.5-46.5</td>
<td>8.2-10.6</td>
<td>24.3-27.9</td>
<td>0.007-0.011</td>
<td>0.111-0.127</td>
<td>23.8-31.4</td>
</tr>
<tr>
<td></td>
<td>23.5</td>
<td>9.40</td>
<td>26.1</td>
<td>0.009</td>
<td>0.119</td>
<td>27.6</td>
</tr>
</tbody>
</table>
In numerator – limits of contents, in denominator – average values.

The absorbed microelements were distributed in the body of plants and carried out by them unevenly, due to the physiological role of each of them, the specifics of biochemical processes in different parts of the plant, the concentration of ions in the soil solution. When ions were promoted to the aboveground bodies, selective absorption mechanisms were used, the priority belonged to physiologically important chemical elements [13; 16; 25].

According to the average total removal of trace elements in almost all grains can be arranged in a single sequence: Fe>Mn>Zn>Cu>Pb>Cd. However, winter rye makes cadmium more than lead, therefore, for it the removal series are as follows: Fe>Mn>Zn>Cu>Cd>Pb (table 3).

### Table 3

<table>
<thead>
<tr>
<th>Plant</th>
<th>Cu</th>
<th>Zn</th>
<th>Cd</th>
<th>Pb</th>
<th>Mn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter rye</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain</td>
<td>6.6</td>
<td>55.6</td>
<td>0.19</td>
<td>0.07</td>
<td>42.5</td>
</tr>
<tr>
<td>Straw</td>
<td>11.4</td>
<td>53.5</td>
<td>0.52</td>
<td>0.61</td>
<td>72.7</td>
</tr>
<tr>
<td>Total</td>
<td>18.0</td>
<td>109.1</td>
<td>0.71</td>
<td>0.68</td>
<td>115.2</td>
</tr>
<tr>
<td>Spring wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain</td>
<td>7.3</td>
<td>42.2</td>
<td>0.06</td>
<td>0.12</td>
<td>64.3</td>
</tr>
<tr>
<td>Straw</td>
<td>29.8</td>
<td>38.9</td>
<td>0.42</td>
<td>0.65</td>
<td>73.0</td>
</tr>
<tr>
<td>Total</td>
<td>37.1</td>
<td>81.1</td>
<td>0.48</td>
<td>0.77</td>
<td>134.6</td>
</tr>
<tr>
<td>Barley</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain</td>
<td>9.3</td>
<td>30.4</td>
<td>0.05</td>
<td>0.26</td>
<td>48.7</td>
</tr>
<tr>
<td>Straw</td>
<td>16.9</td>
<td>38.2</td>
<td>0.14</td>
<td>0.24</td>
<td>44.4</td>
</tr>
<tr>
<td>Total</td>
<td>26.2</td>
<td>68.6</td>
<td>0.19</td>
<td>0.50</td>
<td>93.2</td>
</tr>
<tr>
<td>Oat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain</td>
<td>7.1</td>
<td>51.2</td>
<td>0.11</td>
<td>0.11</td>
<td>59.4</td>
</tr>
<tr>
<td>Straw</td>
<td>8.6</td>
<td>32.7</td>
<td>0.19</td>
<td>0.30</td>
<td>52.6</td>
</tr>
<tr>
<td>Total</td>
<td>15.7</td>
<td>83.9</td>
<td>0.30</td>
<td>0.41</td>
<td>112.0</td>
</tr>
<tr>
<td>Winter wheat</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grain</td>
<td>8.0</td>
<td>45.6</td>
<td>0.03</td>
<td>0.32</td>
<td>35.5</td>
</tr>
<tr>
<td>Straw</td>
<td>38.7</td>
<td>107.0</td>
<td>0.04</td>
<td>0.49</td>
<td>113.5</td>
</tr>
<tr>
<td>Total</td>
<td>46.7</td>
<td>152.6</td>
<td>0.07</td>
<td>0.81</td>
<td>149.0</td>
</tr>
</tbody>
</table>

Depending on the conditions of research fluctuations in the removal of trace elements also varied within the same culture. It should be noted that depending on the type of plant removal of copper ranged 5.3 times, zinc – 2.4 times, cadmium – 17.8 times, lead – 4 times and manganese – 3 times. The share of copper in the total removal of all studied plants varied slightly – from 7 to 15%. A distinctive feature of such physiologically significant elements as zinc and manganese is a high proportion of their participation in the removal of the analyzed elements – from 32 to 45% and from 43 to 53%, respectively. The ratios of the heavy metals studied in plants, as determined by us, indicate a low variability in the proportion of lead and cadmium even in plants that belong to different biological groups (table 4).

### Table 4

<table>
<thead>
<tr>
<th>Plant</th>
<th>Cu</th>
<th>Zn</th>
<th>Cd</th>
<th>Pb</th>
<th>Mn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Winter rye</td>
<td>7</td>
<td>45</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
<td>47</td>
</tr>
<tr>
<td>Spring wheat</td>
<td>15</td>
<td>32</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
<td>53</td>
</tr>
<tr>
<td>Barley</td>
<td>14</td>
<td>36</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
<td>49</td>
</tr>
<tr>
<td>Oat</td>
<td>7</td>
<td>40</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
<td>53</td>
</tr>
<tr>
<td>Winter wheat</td>
<td>13</td>
<td>44</td>
<td>&lt; 1</td>
<td>&lt; 1</td>
<td>43</td>
</tr>
</tbody>
</table>
Vegetable plants play an important role in human nutrition. Due to high yields, they alienate from the soil more nutrients, playing a significant role in the biogeochemical cycle, including the flow of pollutants into the food chain [9; 25]. Due to different morphological and physiological properties plants have the ability to accumulate different amounts of heavy metals and show different resistance to their contents in the soil [11].

Therefore, increasing the productivity of crop production, especially vegetable production, should be inextricably linked to the quality control of the products. A wide range of fluctuations of heavy metals in plants is due to various factors, including the presence of geochemical anomalies, pollution, soil properties, the ability of the genotype to accumulate a particular element [3; 10].

Human health is largely determined by the environmental safety of food. In the production of vegetables, it is necessary to control, first of all, such indicators as pesticide residues, nitrate content, heavy metals. As the results of our previous studies show, in such root crops as carrots, beets, and radishes, the average content of all the studied heavy metals did not exceed the maximum permissible concentrations. In potatoes and cabbage over MPC accumulated Cr. The most polluted was the commercial production of onions. It exceeded the MAC of four toxic elements [11].

The accumulation of heavy metals in vegetables is currently an urgent problem of agricultural production, especially if agricultural land is under anthropogenic pressure. Often, the accumulation of heavy metals in plants does not lead to any change in their presentation, which makes it particularly important to quality sanitary and hygienic control of vegetables coming to the consumer [18; 20].

**Discussion**

The study of the processes of receipt of elements-pollutants in agricultural plants is an important link in ecological and biogeochemical studies, is inextricably linked with the evolution generated by the potential of resistance of plant organisms to different levels of heavy metal pollution. It is necessary to understand how the metal ions are distributed to the organs and tissues of plants, the functional role of various tissues in the absorption and translocation processes, the dependence of the nature of the distribution of these substances in tissues and organs on the environmental conditions, the concentration of heavy metals in it and, finally, the stage of plant organogenesis. In this regard, it is very important to search for plants that protect the organs of assimilate accumulation from excessive intake of HM on the one hand, and accumulate heavy metals in significant quantities in the above-ground organs, for the purposes of their use in phyto remediation – on the other [1].

Different plants may differ in their ability to accumulate TM and their distribution by organs. So in The work of S.V. Obushchenko and V.V. Gnedenko [14], showed a lower content of TM in grain compared with straw, but sunflower observed more of their accumulation in seeds than in the stem.

Our study of TM intake in plants conducted in 2017 on a nitrogen-phosphorus-potassium background without pollution and with soil contamination with lead (500 mg/kg Pb) showed that the root system took over the main protective function against penetration of excess lead into plants (table 5).

<table>
<thead>
<tr>
<th>Versions of experience</th>
<th>the roots</th>
<th>aboveground mass</th>
<th>the tubers</th>
</tr>
</thead>
<tbody>
<tr>
<td>background (NPK)</td>
<td>0,46</td>
<td>0,50</td>
<td>0,15</td>
</tr>
<tr>
<td>background + Pb 500</td>
<td>8,08</td>
<td>1,04</td>
<td>0,34</td>
</tr>
</tbody>
</table>

The total amount of lead contained in the roots when contaminated with this soil element increased by 17.6 times: in the above-ground mass – by 2.1 times; in tubers – by 2.3 times.
Conclusion

To date, a fairly large amount of factual material has been accumulated, which largely allows to assess and understand the physiological aspects of the reaction of plants to the action of heavy metals and the mechanisms of their resistance.

At the same time, the obtained data replenish and concretize knowledge about the chemical composition of plants in connection with the changing conditions of the environment, about the possibility of obtaining environmentally safe products in a particular region. These data can be used in the field of out- and demecology, applied ecology, ecological biogeochemistry and crop production, as well as to find application in environmental monitoring to identify changes in the cycle of substances in ecosystems, in the organization of rational land use and in the planning of reclamation activities.

References

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Hydrochemical Indicators of the Quality of Natural Water of the Small River Hodza

Annotation: the article identifies the water quality indicators of the Small River Hodza (iron, lead, cadmium, aluminum, permanganate oxidation, oil products) that do not meet sanitary and hygienic requirements; which indicates the need for regular monitoring of the river, the development of measures for the protection and environmental improvement of small rivers and their basins.

Key words: hydrochemical indicators, heavy metals, small rivers, low water.

JEL classification: J190, J280.

Introduction
The main reasons for the deterioration of water quality in water bodies of the Moscow Region (MO) are domestic waste water, pesticides, household waste and garbage, oil leaks, industrial waste water, high water consumption by industrial enterprises (including multiple spontaneous intakes of surface and ground waters), illegal dumping of wastes into water bodies, unregulated recreation, fishing poaching [13]. The gradual depletion of groundwater that feeds small rivers does not stop as a result of the massive poorly controlled drilling of “personal” wells [11]. The above sources of pollution of surface waters cause changes in the composition of the water and the appearance of substances that are harmful to the natural background [15]. The most numerous and most vulnerable element of river systems are small rivers – these are rivers with a catchment area of up to 2 thousand square meters. km and average long-term water consumption up to 5 m3 / s for a period of low flow. Small rivers are the basis for the formation of water resources of our country [5]. The well-being of water courses and the living conditions of the population largely depend on their condition [14]. Nowadays, the ecological situation in the basins of small rivers has sharply worsened. There is a depletion of their water resources, a significant deterioration in the quality of surface water and often even irreversible degradation. The unsatisfactory ecological situation in the basins of many small rivers is also expressed in overgrowing and siltation, loss of aquatic biota and other consequences [7]. The Moscow region is characterized by a large population that is increasing every year. Accordingly, the “water footprint” of people is increasing. The complex negative impact
on the aquatic environment leads to nutrient mutations, the disappearance of many fish species, their unsuitability for use in food. The flora and fauna of reservoirs are significantly reduced. Too much oxygen causes water to bloom. The history of anthropogenic impacts on small rivers is very long, but the duration of the stage of total transformation is one to one and a half centuries.

Currently, a number of small rivers in the territory of the municipality are irretrievably lost or are on the verge of extinction, in addition, the water and products of small rivers often pose a threat to human health.

According to the World Health Organization (WHO), 5 million people die each year worldwide due to poor water quality [20].

Ecological safety is a state of protection of vital ecological interests of a person, first of all his rights to a clean, healthy, life-friendly environment, which occurs when a balanced coexistence of it and human economic activity is achieved, when the level of pressure on the environment does not exceed its ability to heal itself [6].

The object of our research was the process of ensuring the ecological safety of the ecosystems of the small Hodza River, originating in the territory of the city district of Elektrostal, Moscow Region.

The subject of the research is the hydrochemical indicators of the water of the Hodza River.

Hydrochemical indicators of water quality – indicators of water quality, characterizing its physical properties and chemical composition of water: temperature, transparency, odor, taste, electrical conductivity, redox potential, pH (pH), main ions, biogenic and organic substances, dissolved gases and pollutants [1].

The purpose of the study is to assess the analysis of the obtained data of hydrochemical indicators of water of the Small Hodza River and the identification of indicators exceeding or close to the maximum permissible concentrations (MAC) of substances for fishery reservoirs, as well as identifying the shortcomings of the existing control system, developing proposals and recommendations for its improvement.

To achieve the goal, we set the following tasks:

1) to study the economic and geographical position of the city district of Elektrostal, Moscow region;
2) to consider the sources of pollution of a water body and the composition of pollutants, as well as the consequences they have on people;
3) analyze the ecological state of the Hodza river water at the source (55°48′35″ north latitude 38°28′49″ east longitude), intermediate point (55.804496 north latitude, 38.514863 east longitude) and estuary (55°46′28″ north latitude 38°38′37″ east longitude);
4) to propose measures aimed at eliminating the negative consequences leading to the deterioration of the water quality of the Hodza River.

The methodological basis of the work is the principle of integrated monitoring of the main hydrochemical indicators and compliance with the ecological and hygienic concept of their rationing, allowing to manage the state of the environment [19].

Hypothesis of the study: suggests a significant relationship between the water quality of the river and the functioning of industrial enterprises.

The city of Elektrostal is the center of heavy engineering and metallurgy, has the largest Russian production of nuclear fuel, chemical products and high-quality steel. In addition, along with these enterprises in the city district there are:

- Open Joint Stock Company «Elektrostal Heavy Machine Building Plant» is a manufacturer of technological equipment for the metallurgy and mining industry.
- “Electrostal Chemical-Mechanical Plant named after Zelinsky” is one of the leading enterprises in Russia in the development and serial production of filtering equipment for individual and
collective protection against weapons of mass destruction and chemically hazardous substances, filter fabrics, catalysts, chemical absorbents, desiccants and active carbons [16].

**Methodology**

Monitoring and sampling of the water of the small Hodza river was carried out in 2018 during periods of high water, summer and autumn low water (in April, August and November) at the source, intermediate point and estuary. The study of the ecological state of aquatic ecosystems is necessary for the timely detection of high levels of pollution, assessment and prediction of the development of the situation. Sampling was carried out taking into account the requirements of “State Standard 31861-2012 Water General requirements for sampling” and was carried out from a depth of 0.3–0.5 meters in triplicate in the amount of 1 liter in plastic bottles and 1 liter in dark glass bottles for determination of petroleum products [12]. Chemical and analytical work was carried out in accredited testing laboratories of Moscow State University named after M.V. Lomonosov and “Center for Hygiene and Epidemiology in the Moscow region” in the Noginsk district, the cities of Balashikha, Railway, Reutov, Chernogolovka, Elektrostal.

In the selected samples, the following parameters were determined: pH and alkalinity – by potentiometric method, chromaticity – by photometric method, nitrate and nitrite ions, total nitrogen, phosphate – ions, total phosphorus, silicon – by spectrophotometric method, permanganate oxidation and bichromate oxidizability – by titrimetric method, determination of total organic carbon, sulfate ions and chloride ions – chromatographic method. The method of capillary electrophoresis was determined: potassium (K), sodium (Na), calcium (Ca), magnesium (Mg). The content of petroleum products in water was studied by IR spectrometry. The concentrations of heavy metals and metalloids were determined by an atomic absorption method with electrothermal atomization and flame atomization.

Low flow – seasonal standing of low (low-water) water levels in rivers. These are dry periods with a duration of at least 10 days, due to periods of dry or freezing weather, when the water content of the river is maintained mainly by groundwater with a strong decrease or cessation of surface runoff. In the temperate and high latitudes, summer and winter (autumn) low water are distinguished (the low-water period with the presence of ice phenomena belongs to the winter or autumn) [17].

The integral assessment of pollution of the surface waters of the small river Hodza is carried out on the basis of the pollution index (WPI) according to the formula (1):

\[
WPI = \frac{\sum_{t=1}^{n} \frac{C_i}{MAC_i}}{N},
\]

where \(C_i\) – is the concentration of a substance, \(MAC_i\) – is the maximum permissible concentration for a corresponding substance, \(N\) – is the number of indicators used for the calculation, most often strictly limited and equal to 6.

The index of the Hodza River water pollution was calculated using average annual concentrations of iron, aluminum, permanganate oxidation, cadmium, lead, and oil products [2]. The basis for the selection of these indicators based on the results of test reports. During the three periods of water withdrawal and requirements for the quality of fish water for economic purposes.

**Results**

As shown by the results of the research, in the source during the spring flood, the maximum permissible concentrations of substances in water for fisheries are exceeded according to indicators such as iron, aluminum, and permanganate oxidability; during the summer low water period – lead, cadmium, iron, ammonia and ammonium ion; in the period of autumnal low water – iron, permanganate oxidability.
Definition of a complex indicator of water quality as the sum of the ratios of concentrations of the substances under consideration to their MAC, determined by six indicators and their assessment on a scale to determine the degree of contamination and the class of water quality depending on the value of WPI (Table 1).

### Scale to determine the degree of pollution and water quality class, depending on the value of WPI

<table>
<thead>
<tr>
<th>Quality class</th>
<th>Text description</th>
<th>Size IZV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very clean</td>
<td>&lt; 0,2</td>
</tr>
<tr>
<td>2</td>
<td>Net</td>
<td>0,2–1,0</td>
</tr>
<tr>
<td>3</td>
<td>Moderately polluted</td>
<td>1,0–2,0</td>
</tr>
<tr>
<td>4</td>
<td>Polluted</td>
<td>2,0–4,0</td>
</tr>
<tr>
<td>5</td>
<td>Dirty</td>
<td>4,0–6,0</td>
</tr>
<tr>
<td>6</td>
<td>Very dirty</td>
<td>6,0–10,0</td>
</tr>
<tr>
<td>7</td>
<td>Extremely dirty</td>
<td>&gt; 10</td>
</tr>
</tbody>
</table>

The water in the source of the Hodza river during the spring flood period belongs to the 6th class of quality, which characterizes it as very dirty, in the period of summer and autumn low water – 7th class of quality, extremely dirty (Table 2). In the source in the flood mode, the maximum permissible concentration of iron, aluminum, oxidability of permanganate was observed, in the summer low water – lead, cadmium, iron and ammonia and ammonium, in winter – iron and permanganate oxidation.

### Dynamics of MPC exceedances by individual indicators and water quality at the source in spring, summer and autumn, 2018

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Excess of maximum concentration limit, (mg / l)</th>
<th>Timing of sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe</td>
<td>0,984</td>
<td>spring</td>
</tr>
<tr>
<td>Al</td>
<td>0,562</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>0,0001</td>
<td></td>
</tr>
<tr>
<td>Cd</td>
<td>0,0001</td>
<td></td>
</tr>
<tr>
<td>Oil products</td>
<td>0,02</td>
<td></td>
</tr>
<tr>
<td>Permanganate oxidability</td>
<td>11,0</td>
<td></td>
</tr>
<tr>
<td>WPI</td>
<td>6,9</td>
<td></td>
</tr>
<tr>
<td>Fe</td>
<td>20</td>
<td>summer</td>
</tr>
<tr>
<td>Al</td>
<td>0,04</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>0,023</td>
<td></td>
</tr>
<tr>
<td>Cd</td>
<td>0,010</td>
<td></td>
</tr>
<tr>
<td>Oil products</td>
<td>0,113</td>
<td></td>
</tr>
<tr>
<td>Permanganate oxidability</td>
<td>7,0</td>
<td></td>
</tr>
<tr>
<td>WPI</td>
<td>74,4</td>
<td></td>
</tr>
<tr>
<td>Fe</td>
<td>35,8</td>
<td>autumn</td>
</tr>
<tr>
<td>Al</td>
<td>0,045</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>0,005</td>
<td></td>
</tr>
<tr>
<td>Cd</td>
<td>0,0005</td>
<td></td>
</tr>
<tr>
<td>Oil products</td>
<td>0,039</td>
<td></td>
</tr>
<tr>
<td>Permanganate oxidability</td>
<td>6,3</td>
<td></td>
</tr>
<tr>
<td>WPI</td>
<td>123,94</td>
<td></td>
</tr>
</tbody>
</table>

Water in summer and in winter at an intermediate point of a water body can be attributed to the 7th class of quality – extremely dirty (Table 3).

### Dynamics of MPC exceedances for individual indicators and water quality at an intermediate point in the summer and autumn, 2018

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Excess of maximum concentration limit, (mg / l)</th>
<th>Timing of sampling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fe</td>
<td>3,4</td>
<td>summer</td>
</tr>
<tr>
<td>Al</td>
<td>0,04</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>0,0001</td>
<td></td>
</tr>
<tr>
<td>Cd</td>
<td>0,0001</td>
<td></td>
</tr>
<tr>
<td>Oil products</td>
<td>0,103</td>
<td></td>
</tr>
<tr>
<td>Permanganate oxidability</td>
<td>7,0</td>
<td></td>
</tr>
<tr>
<td>WPI</td>
<td>13,276</td>
<td></td>
</tr>
<tr>
<td>Fe</td>
<td>6,5</td>
<td>autumn</td>
</tr>
<tr>
<td>Al</td>
<td>0,045</td>
<td></td>
</tr>
<tr>
<td>Pb</td>
<td>0,005</td>
<td></td>
</tr>
<tr>
<td>Cd</td>
<td>0,0005</td>
<td></td>
</tr>
<tr>
<td>Oil products</td>
<td>0,45</td>
<td></td>
</tr>
<tr>
<td>Permanganate oxidability</td>
<td>17,1</td>
<td></td>
</tr>
<tr>
<td>WPI</td>
<td>27,745</td>
<td></td>
</tr>
</tbody>
</table>

At the intermediate point in the summer low water, the iron exceeded the MPC, and in the autumn low water, the permanganate oxidation, petroleum products and iron, respectively.
In the estuary, in the summer and autumn periods, the MPC was exceeded only by iron (Table 4).

**Table 4**

**Dynamics of MPC exceedances for individual indicators and water quality at the mouth in the summer and autumn, 2018**

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Excess of maximum concentration limit, (mg / l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timing of sampling</td>
<td>Fe</td>
</tr>
<tr>
<td>summer</td>
<td>1,82</td>
</tr>
<tr>
<td>autumn</td>
<td>15,2</td>
</tr>
</tbody>
</table>

According to the scale of the pollution index, the water from the mouth in the summer belonged to the 6th quality class, the category is very dirty, in the winter – to the 7th class, extremely dirty.

In addition to the above indicators, among the indicators defined by us, water quality is characterized by pH, affecting the development and livelihoods of aquatic biota, both directly and indirectly. Water in all periods of selection for pH is neutral, corresponding to the requirements for water bodies of fisheries value (from 6.0 to 9.0 pH) (table 5).

**Table 5**

**The main indicators of surface water pollution of the small river Hodza**

<table>
<thead>
<tr>
<th>No.</th>
<th>Chemicals, (mg / l)</th>
<th>MPC</th>
<th>Source</th>
<th>Intermediate point</th>
<th>Mouth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PH value, pH unit</td>
<td>6,0–9,0</td>
<td>18.04.18</td>
<td>02.08.18</td>
<td>21.11.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6,0</td>
<td>6,80</td>
<td>7,88</td>
</tr>
<tr>
<td>2</td>
<td>BOD full</td>
<td>-</td>
<td>14,4</td>
<td>14</td>
<td>14,2</td>
</tr>
<tr>
<td>3</td>
<td>COD</td>
<td>30</td>
<td>16,7</td>
<td>16,9</td>
<td>14,8</td>
</tr>
<tr>
<td>4</td>
<td>Petroleum hydrocarbons</td>
<td>0,3</td>
<td>0,02</td>
<td>0,113</td>
<td>0,039</td>
</tr>
<tr>
<td>5</td>
<td>Ammonia and ammonium ion</td>
<td>1,5</td>
<td>0,580</td>
<td><strong>22,4</strong></td>
<td>0,88</td>
</tr>
<tr>
<td>6</td>
<td>Nitrogen common</td>
<td>-</td>
<td>2,54</td>
<td>2,51</td>
<td>2,56</td>
</tr>
</tbody>
</table>

The content of chloride and sulfate ions and cations of potassium and sodium, which according to our data in the river is low, is also determined (Table 6).

**Table 6**

**The content of the main cations and anions during the spring flood in the source**

<table>
<thead>
<tr>
<th>Definable indicator</th>
<th>Measurement result</th>
<th>Standard value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chloride</td>
<td>11,7</td>
<td>350</td>
<td>mg/l</td>
</tr>
<tr>
<td>Sulfate</td>
<td>20,5</td>
<td>500</td>
<td>mg/l</td>
</tr>
<tr>
<td>Cations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potassium</td>
<td>1,62</td>
<td>-</td>
<td>mg/l</td>
</tr>
<tr>
<td>Sodium</td>
<td>5,29</td>
<td>200</td>
<td>mg/l</td>
</tr>
</tbody>
</table>
The excess of MPC for oil products in the autumn low flow period is connected, in our opinion, with the spill of fuel oil from the storm water channel on the territory of Electrostal into the river in September 2012.

In the summer low water period at the source, the maximum permissible concentration of ammonia and ammonium ion was observed to be 15 times higher. Ammonium compounds contain nitrogen in the minimum oxidation state «-3». Ammonium cations are the product of microbiological decomposition of animal and plant proteins. The ammonium formed in this way is again involved in the process of protein synthesis, thereby participating in the biological cycle of substances (nitrogen cycle). For this reason, ammonium and its compounds in low concentrations are usually present in surface natural waters. There are two main sources of environmental pollution by ammonium compounds. Namely: ammonium compounds in large quantities are part of the mineral and organic fertilizers, excessive and improper use of which leads to the corresponding pollution of water bodies. In addition, ammonium compounds in significant quantities are present in sewage (feces). Not properly disposed of sewage can penetrate the groundwater or wash off surface water in the reservoirs. Runoff from pastures and livestock gathering sites, wastewater from livestock farms, as well as household and household faecal streams always contain large amounts of ammonium compounds. Hazardous contamination of groundwater with household and faecal and domestic wastewater often occurs during depressurization of the sewage system. For these reasons, an increased content of ammonia nitrogen in surface waters is usually a sign of economic and fecal contamination. For water bodies, an increased content of ammonium nitrogen can also be associated with a low rate of decomposition of organic substances.

Mobile iron complexes in significant quantities are contained in the surface waters of the river. Iron is a characteristic element of the natural waters of the zone of excessive moisture. In the case of high concentrations of water has an unpleasant taste, odor, color. Exceeding MPC for iron belongs to the natural features of the territory, but monitoring for its content is necessary, since elevated iron content negatively affects human health, namely the appearance of dermatitis, allergic reactions, liver and kidney diseases, but the most dangerous is hemochromatosis.

Heavy metals are elements of the periodical system of chemical elements D.I. Mendeleev, with a relative molecular weight of more than 40. One of the strongest in action and the most common chemical contamination is heavy metal contamination [16].

It should be noted that heavy metals at high concentrations adversely affect biological objects and ecosystems. Heavy metals on the scale of pollution and effects on biological objects occupy a special place among the pollutants. Impact can be direct and indirect [4]. In the first case, reactions involving enzymes are blocked, which leads to a decrease or cessation. In the second case, the nutrients are transferred to an inaccessible form, and a state of “starvation environment” is created.

Heavy metals are dangerous because they are slowly removed from the environment. For example, the half-life of lead is between 740–5900 years.

As is known, heavy metals are trace elements that make up thousandths of a percent of the mass of the earth’s crust. But they are scattered unevenly in the natural environment. Their concentration can be due to two reasons.

The first is the natural geochemical anomaly, that is, the concentration of certain trace elements occurs as a result of geological processes taking place in the lithosphere.

The second is anthropogenic activity. The concentration of elements occurs as a result of technological processes carried out by man.

Heavy metals are also dangerous because, unlike organic pollutants, they are not capable of breaking down to safe forms (Table 7).
Table 7

The content of heavy metals in the surface waters of the small river Hodza, mg / l

<table>
<thead>
<tr>
<th>No.</th>
<th>Indicator</th>
<th>MPC</th>
<th>Source</th>
<th>Intermediate point</th>
<th>Mouth</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Si</td>
<td>10</td>
<td>18.04</td>
<td>2.08</td>
<td>21.11</td>
</tr>
<tr>
<td>2</td>
<td>Fe</td>
<td>0.3</td>
<td>0.984</td>
<td>20</td>
<td>35.8</td>
</tr>
<tr>
<td>3</td>
<td>Cu</td>
<td>1.0</td>
<td>0.001</td>
<td>0.007</td>
<td>0.01</td>
</tr>
<tr>
<td>4</td>
<td>Ni</td>
<td>0.02</td>
<td>0.008</td>
<td>0.005</td>
<td>0.015</td>
</tr>
<tr>
<td>5</td>
<td>Co</td>
<td>1</td>
<td>0.021</td>
<td>0.02</td>
<td>0.014</td>
</tr>
<tr>
<td>6</td>
<td>Zn</td>
<td>0.1</td>
<td>0.059</td>
<td>0.020</td>
<td>0.01</td>
</tr>
<tr>
<td>7</td>
<td>Mn</td>
<td>0.006</td>
<td>0.0001</td>
<td>0.023</td>
<td>0.005</td>
</tr>
<tr>
<td>8</td>
<td>Pb</td>
<td>0.005</td>
<td>0.0001</td>
<td>0.010</td>
<td>0.005</td>
</tr>
<tr>
<td>9</td>
<td>Cr</td>
<td>0.005</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
<tr>
<td>10</td>
<td>Cd</td>
<td>0.005</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
<tr>
<td>11</td>
<td>Hg</td>
<td>0.0005</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Aluminum has a slight toxic effect, but many water-soluble inorganic compounds of this element remain in the dissolved state for a long time and can have a harmful effect on humans and warm-blooded animals through drinking water. The most poisonous are chlorides, nitrates, acetates, sulfates. First of all, TM affects the nervous system, accumulates in the nervous tissue, leading to severe disorders of the central nervous system.

Lead in water is rapidly oxidized to hydroxides, or if there is an impurity of hydrogen sulfide, oxidation also occurs to sulfides, which are practically insoluble in water. Due to the large mass of oxides and the metal itself is deposited on the bottom and deposited silt. Lead is very dangerous even with small amounts and can cause intoxication. Lead penetrates the body through the respiratory and digestive systems. Its excretion from the body is very slow, and it can accumulate in the kidneys, bones and liver.

Water pollution by cadmium can be caused by precipitation, industrial wastewater, cadmium leaching from agricultural land and water seeping from waste storage facilities (landfills). There are enough industrial enterprises in the area of the Hodza River, therefore in this case this factor is limiting [3].

The concentration of dissolved oxygen in the water of the Hodza River is stable in all the sampling sites, indicating that the ecological self-cleaning function has not been lost (Table 8).

Table 8

Dissolved Oxygen Concentration in the Water of the Hodza River during the low water period

<table>
<thead>
<tr>
<th>Dissolved oxygen concentration</th>
<th>Measurement result mg / dm³</th>
<th>Standard value</th>
</tr>
</thead>
<tbody>
<tr>
<td>02.08.2018</td>
<td>source: 6,80</td>
<td>intermediate point: 7,0</td>
</tr>
</tbody>
</table>

Discussion

The results indicate the need for systematic toxicological observations in the area where the water body is located for the presence of heavy metals, petroleum products in water, and in the depositing medium – bottom sediments, coastal soil, plants and fish. Similar tests previously in this area were not conducted. The obtained data will be useful for the activities of young scientists, the Department of Traffic Management, Transport, Communications and Ecology.
of the Administration of the city district Elektrostal in the field of ensuring the environmental safety of a water body in the city.

**Conclusion**

The scientific novelty lies in the fact that for the first time data for 58 indicators were obtained for the water of the Hodza River. Unfortunately, the economic factor does not allow to conduct research on all indicators of water quality.

The city of Elektrostal is one of the leading industrial cities of our country, a large number of operating industrial enterprises are located in a fairly small area of the urban district. That is why, in the city, ensuring environmental safety of water bodies and environmental protection, in general, receives more attention, unfortunately, not always achieving its result.

The largest discharge of wastewater into the natural water body Klyazma is made by the enterprise: MSZ OJSC with its subsidiaries. In the vicinity of the city of Elektrostal, the Vokhonka River (a tributary of the Klyazma) originates, as well as the tributaries of the Vohna – Marinka and Khodtsa.

So, characterizing the pollution of the surface waters of the investigated water body by hydrochemical parameters, the excess of MPC for iron should be allocated at all sampling periods and at all points (the maximum excess is 119 times). The maximum permissible concentration of aluminum in the flood is 2.81 times, the excess of permanganate oxidation during the flood period at the source is 2.2 times during the low water period at the source at 1.26 times and at the intermediate point 3.42 times, respectively. During the spring flood, it was also revealed in the course of laboratory studies that the maximum permissible concentration in the source was 3.4 times turbid and 3 times chromatic. During the spring flood, bottom sediments that contain hazardous substances can enter the waters of the small river Hodza. In addition, some chemicals in the winter frozen into the ice, which will soon begin to actively melt. The cadmium excess by 2 times and lead by 3.8 times was observed only during the summer low water period and only at the source. For ammonia and ammonium ion / for nitrogen / the standard value was exceeded during the summer low water period at the source by 14.9 times, and in the autumn low water period it approached the MPC. In the autumn low-flow period at the intermediate point, the MPC for petroleum products exceeded 1.5 times.

The above indicates that further attention must be paid to such indicators as turbidity, chromaticity, iron, aluminum, permanganate oxidation, cadmium, lead, ammonia and ammonium ion and oil products.

The overall assessment of the surface water quality of the investigated water body, conducted on the basis of the hydrochemical index of water pollution (WPI) indicates “dirty” and “extremely dirty” water, in the source in the interval from 6.9–123.94; the intermediate point is from 13.276–27.745 and in the USC from 7.146–62.765.

All other determinable indicators are within the normal range, but this may be due to the fact that the enterprises first mix the emissions with water in the pools at the enterprises to dilute the concentration of harmful substances, and then gradually this mixture is discharged into the river, the rules are not violated by these manipulations. but the river remains heavily polluted.

Thus, the chemical composition of the surface waters of the studied Hodza river is formed under the influence of both natural factors and sources of anthropogenic impact. To restore water quality, in our opinion, it is necessary:

- develop a unified integrated methodology for the study and rehabilitation of small rivers, which should be based on geographical approaches;
- increase the availability of reliable information on small rivers;
- approve the passport of a small river;
- increase the coefficient of payment for the negative impact on the water body;
- reduce the standards for discharges into water bodies [18];
- introduce benefits to enterprises for greening production;
recreate the environmental police and other activities. But, first of all, it is necessary to begin with ourselves, because it is not for nothing that the etymology of the word “ecology” is translated from Greek as “the science of the house, dwelling”. And, the basis of all the above should be the law. In accordance with the Constitution of the Russian Federation, everyone has the right to a favorable environment, everyone is obliged to preserve nature and the environment, take care of the natural resources that are the basis of sustainable development, life and activities of the peoples living in the Russian Federation [8; 9].

References

REFERENCE TO ARTICLE

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