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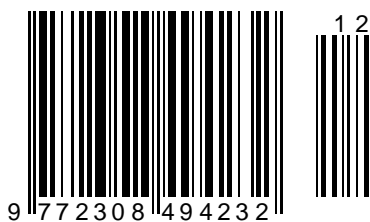
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Article



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FOREIGN EXPERIMENTS ON THE DEVELOPMENT OF FARMS AND THEIR PROMISING AREAS

Abstract: This article provides a statistical analysis of the experience of economically developed countries in the development of farms and discusses their promising areas.

Key words: Farming, protectionism, civilization, mechanization, mineral fertilizers, agro-industrial complex, productivity, efficiency.

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Introduction

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Governments of developed countries are trying to support local agricultural producers in any way, including by applying various protectionist measures to circumvent the rules of the World Trade Organization (WTO), as administrative authorities are trying to support developing agricultural producers in every possible way. The middle class is the key to socio-economic stability in a civilized society. France is the largest producer of agricultural products in Western Europe and one of the largest exporters in the world. This is due to favorable natural conditions and large areas of usable land. The area of agricultural land is 2/3 of the territory of France (about 35 million hectares), the share of arable land is steadily decreasing, and the areas covered with grasses are increasing, which is due to the increased specialization of animal husbandry.

Agricultural arable land 16.8 mln.ga, perennial plantations of 2.2 million hectares (vineyards and orchards), pastures and hayfields of 13.9 million hectares, forests of 14.5 mln.ga ni. In the structure of agriculture, 43.3% corresponds to agriculture, in particular: cereals – 16.0%, vegetables and fruits – 9.0%, grapes (for winemaking) – 8.5%; livestock – 56.7%, including: meat production – 26.1%, milk – 18.6%, poultry and egg production – 7.7%. In terms

of gross grain production, France ranks fourth after Russia, India and Canada. 100% of the French population is provided with products of their own production.[4]

Agriculture in the UK is one of the most mechanized sectors in the world, with high productivity and the least amount of labor.[5]. The country has a developed farm system (about 250 thousand) and powerful livestock complexes. Over the past 20 years, self-sufficiency in agricultural products has increased from 68% to 85%.

The volume of production of products such as cereals, beef, pork, poultry, eggs, milk satisfies or increases consumption needs. Due to the presence of a powerful natural forage base and soils of limited quality for agriculture (only 23% of the country's territory has been plowed), animal husbandry prevails in the production structure (60%). The main branch of animal husbandry is the breeding of cattle in different directions: dairy and meat-dairy cattle breeding routes are being formed in the north and west of the country and around large cities, and there are also special breeds designed for meat feeding. The number of cattle is 15 million. per capita, sheep - 30 million heads, pigs - 8 million heads, poultry - 100 million heads. More than 4 million tons of meat and 15 million tons of milk are grown per year. Many world-famous breeds of cattle, sheep, pigs and horses are named after English counties. This phenomenon is associated with

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limited land resources, the early development of commodity relations, and the possibility of improving production in a rich country.

Agriculture provides 23-25% of the country's agricultural output. Crops with cobs (more than 10% of arable land) are grown in agriculture, including wheat (18%) and barley (11%), as well as oats. About 17 million hectares of land are used for agricultural purposes, of which 5 million hectares are arable land. 7 mln.ga is planted with herbs and 5 mln.ga consists of rough pastures.

In terms of agricultural production, the United Kingdom occupies one of the leading places in the world. It ranks first in Western Europe in terms of the number of sheep.[6].

Germany is a country with highly developed agriculture. Germany is one of the largest producers of agricultural products in the European Union. More than half of the country's territory, that is, almost 19 million hectares of land, is used in agriculture. Animal husbandry provides 4/5 of the income from agricultural products. These are meat, hard cheeses, butter, etc.

The high intensity of agricultural production is ensured by extensive mechanization and electrification, the use of modern means of fertilization and pest control. The basis of sorting is wheat, its high-yielding varieties yield up to 70 kg/ha. Rye, oats, and barley are also grown in them. In terms of gross grain harvest, the country ranks third in Europe.[7].

From the experience of developed countries in Western Europe in a market economy, it is clear that the efficiency of agro-industrial production and rural development largely depend on government regulation and support. In agriculture in developed economies, there is a credit system in which agricultural financing has its own characteristics. For example, in the UK there is no specialized agricultural credit system, and farms are supported by government subsidies, their share in the cost of agricultural products is more than a quarter and is one of the largest in the world.

Germany has an investment incentive program that reduces the interest rate on long-term loans by 4%. Interest on a loan from mortgage banks is 6-8.5%. According to economists and statisticians, in different periods of crop growth in different countries, this ensures economic growth from 40% to 90%. Germany today has the experience of post-war development, thanks to which the country has high performance indicators and belongs to the economic leaders of the world.[8].

French farmers receive subsidies to increase productivity, improve living conditions, remove arable land from agricultural production, support land productivity, as well as compensation payments for working in areas with unfavorable natural conditions.

In France, cooperatives have been established that share the means of production. Such cooperatives are engaged in tillage, fertilization, harvesting, land reclamation, etc. Machine-building societies (3-5 enterprises) and machine parks have been established in Germany, agricultural machinery is also used individually and belongs to team members. The equipment is leased by mutual agreement and, first of all, according to the schedule. Payment for the equipment is usually made at the end of the year.

In the following years, the level of support for agricultural producers in Germany from cooperative associations has increased significantly. The necessary seedlings from greenhouses of these subjects

Analyzing the legal regulation and law enforcement practice in the United States concerning the sale and purchase of agricultural products by the state, let's summarize some provisions of the Food Safety Act adopted in the United States in 1985. Its adoption is primarily related to the domestic political and economic situation in the country. The law approved a policy of maintaining subsidies for agriculture, purchasing agricultural products from budget funds and introduced new rules and mechanisms for purchasing agricultural products, as well as foreclosing on them in exchange for government loans, both for the domestic market and for exports. On such an expanded legal basis, the funds allocated to agriculture from the state budget were increased to 58 billion US dollars. This allows the US government not only to regulate market fluctuations, the amount of arable land and agricultural products from agricultural producers (mainly farmers

The same law provides and establishes the procedure for resolving issues of rational land use, combating soil erosion, and removing eroded lands from agriculture. If the agricultural producer did not participate in the implementation of anti-erosion measures, he did not receive state subsidies, and if the drainage of swamps carried out by him was negative, this affected the biological condition and hydrology of the territory deprived of them.[9].

It is recommended to fix such rules in the legislation of each state, since there are many factors that negatively affect not only the quality and productivity of agricultural land, but also the environment and human health in general.

The nature of state regulation of agriculture in Germany and other EU countries is determined by the common agricultural policy. The protection of agricultural producers is mainly aimed at maintaining purchase prices, purchasing volumes to a certain extent, subsidizing certain types of goods and ensuring a proportional ratio of the volume of purchases of agricultural products with the volume of public investment and lending. The volume of

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purchases of agricultural products in Germany is planned annually.

According to our analysis, the main issue in the agricultural policy of any state is price.

Japan is a prime example of the chain support of domestic agricultural producers, where prices for the purchase of agricultural products are several times higher than world prices.[10].

In Sweden, the price level for the purchase of agricultural products, in particular food, is determined annually during negotiations between the Government and the association of agricultural producers with the participation of consumer representatives.[11]. If we turn to the experience of selling agricultural products of the European Union, we can conclude that its legislation also contains provisions on government orders and purchases. Government orders are defined as agricultural products, the purchase of goods and various agricultural services, the performance of works, etc. In addition, the scope of government orders is somewhat limited and therefore does not apply to the agricultural market, but is limited only to transport, telecommunications, energy, water supply, etc. This does not mean limiting the right of EU member States to use a state order, the subject of which is agricultural products. This is due to the fact that one of the effective ways to manage the agro-industrial complex of the European Union countries is to carry out their food procurement procedure.

Taking into account the public procurement system in these countries, several important points should be noted. Experts believe that the total number of public procurement contracts in the EU exceeds 500 billion euros per year. In recent years, there has been a clear growth trend in the volume of government purchases of agricultural products, which currently account for an average of 16% of GDP. In order to ensure the legality and effectiveness of public procurement activities, a detailed regulatory framework has been created, which is based on the Rome and Maastricht Treaties and at the same time provides a basis for improving legislation on the regulation of agricultural procurement. Products in the EU member states. This became the basis for the creation of a unified legal space for procurement tenders and made it possible to make changes and additions at the level of individual countries, taking into account their interests in legislation.

All public procurement systems in the European Union are regulated by special directives on the procurement of agricultural products, works and services. Since they are often overly complex in content, two directives are currently in use, developed by a special commission of the European Union and adopted on January 1. The first is 2006 No.2004/18/ES - regulation of the above-mentioned relations in the public sector, and the second No. 2004/17/ES - regulation of similar relations in the public sector of the European Union countries. The

largest political innovation in these directives is the combination of three pre-existing conditions for the purchase of agricultural products, the provision of services and works, and the delivery of goods: new forms of procurement, tenders for the purchase and supply of agricultural products, liability for non-fulfillment of obligations under the terms of electronic market information systems on electronic auctions and other progressive regulations.[12]. In this regard, it should be noted that in the distribution, exchange and consumption of food products, including the mechanism of public procurement of agricultural products, at the present stage of European trade, the subjects of these relations use electronic technologies in whole or in part, and legislation is considered the rules governing all types of interaction.

One of the main elements of public procurement in the European Union is that all necessary tender requirements are published in its official newspapers and collections, which means that they are considered "transparent" for all entities.

Thus, information on all contracts that are received by the Office of Official Communications in Luxembourg, in accordance with the directives, is published in the daily issue "B" - in the appendix to the official collection, as well as in the electronic database of the European Union and the daily newspaper of electronic tenders. It is carried out on a competitive basis with guarantees of receiving orders for the purchase of agricultural products for state suppliers and a possible complaint about the legality of concluding contracts or violation of the relevant legislation of the participating States. The national legislation of the member States of the European Union has rules and measures to protect against violations of public procurement legislation. For example, the German Charter of February 22, 1994 "On the procedure for monitoring the placement of government orders" provides for a two-stage control system. First of all, the order placement verification service carries out administrative control. As a rule, such an authority is the administration at the customer's location, or the person responsible for placing the order is his authorized representative. The second instance is the committee for monitoring their correct location, which is an independent supervisory body similar in its functions to the judicial system.

In the Russian Federation, on December 2, 1994, the law "On Procurement and supply of agricultural products, raw materials and food for State needs" was adopted.[13] Establishes general legal, economic principles and rules for concluding contracts and executing orders for the purchase and supply of agricultural products, raw materials and food for state grants to enterprises, institutions and organizations located on the territory of the Russian Federation. The law establishes two levels of formation and placement of orders for the purchase and supply of agricultural products, raw materials and food products: federal and

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regional. This leads to the development of targeted federal programs for the development of agro-industrial production, other economic and social programs aimed at providing the population with food.

At the same time, state bodies should apply not only economic, but also administrative methods of state support, primarily for licensing and quotas for exports and imports of agricultural products. The state must create conditions to ensure a certain ratio between imports and domestic products, especially when the balance of payments of an agricultural producer deteriorates and the balance is disrupted in relation to certain goods on the domestic market.

Considering that departmental organizations play a key role in the development of the agricultural market, solving marketing tasks and providing the population with environmentally friendly food, public authorities should effectively regulate prices for agricultural products, insure them and provide them by the state. It is necessary to support agricultural enterprises through a mechanism to further reduce the interest rate on loans.

Thus, in the United States of America, there is a state program to support the farming movement "stabilization of farmers' incomes", which includes from 30% to 50% of all budget funds allocated to agriculture for its implementation: "State price support program", "plant insurance" and "agricultural credit".[14].

Under these programs, farmers receive sales loans from the Ministry of Agriculture to finance production, repaying borrowed funds after the sale of crops at market prices. If market prices fall below the level of control established by Congress, the state buys the products. In addition, in the United States, the Government restricts imports of products that meet the demand of domestic producers and provides loans to foreign buyers to purchase surplus agricultural products. It should be noted that wholesale agricultural markets in Poland were established with the financial and organizational support of local authorities and Polish banks. At the same time, the Gdansk and Lublin markets were built with borrowed funds from the World Bank, and the Warsaw market was built with the support of the European Bank for Reconstruction and Development. In order to increase the income of agricultural enterprises in the wholesale markets of Poland, the state agricultural market sells seasonal surpluses at low prices and interventional purchases during periods of shortage.

Despite the unfavorable conditions for the cultivation of many crops in Japan, wholesale agricultural markets are successfully functioning at two levels (state and local). The founder of the first-class markets is the Ministry of Agriculture of Japan, while the founders of the second-class markets are the provinces. In the wholesale markets of food products, whose share in the total volume of the main types of

agricultural products is 75%, state and local authorities have established strict control over compliance with antimonopoly legislation, product quality and smuggling.[15].

Unlike the countries discussed above, the share of the wholesale market for the sale of agricultural products in England is not so large - 35% and 65% are retail enterprises, including commercial enterprises (supermarkets), specialty stores of fruits and vegetables, cooperatives, wholesale markets and catering enterprises that purchase goods in bulk through auctions.[16].

When discussing possible effective ways to sell agricultural products around the world, reference should be made to the Dutch experience, where the most popular form is an auction, with a significant proportion being sold through open auctions. There is an opinion that in the future, the auction should become the most popular mechanism for selling agricultural products. A prerequisite for the successful functioning of such a market is a market balance in which there are many sellers and buyers, as well as high quality certified products that are properly packaged.

There is no such form of market in Russia yet, and therefore it is difficult to determine the prospects for this kind of interaction, since during the trading season supply significantly exceeds demand, which leads to losses for many manufacturers. In addition, in addition to auctions, an important aspect for the industry is the need to create large logistics complexes with developed infrastructure, which are the main components of the product delivery system (for example, the USA, Canada, Western Europe, Australia). Unfortunately, in the Russian Federation, such logistics is still at an early stage of development.

The existing conditions in Russia determine the priority of strategic directions for the development of the local agro-industrial complex, one of which is the development of infrastructure and social nutrition systems, the construction of wholesale distribution centers, and the formation of regulatory documents. It is worth noting that the creation of modern warehouses built using innovative technologies can significantly reduce the loss of manufactured products in accordance with global patterns. The country provides agricultural products, especially in the off-season, as well as the year-round national market with high-quality organic products from Russian farmers.

The Ministry of Agriculture of the Russian Federation has ambitious plans to create a federal network of wholesale distribution centers for agricultural products, which announced the need to create a federal wholesale distribution network within the framework of the Russian Investment Forum in Sochi (February 2018).[17]. There are 9 centers for the sale of agricultural products in Russia. When implementing this initiative, it is necessary to take into account market conditions, the scale of suppliers and

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consumers when organizing wholesale distribution centers of agricultural products in places of maximum concentration of industry and at the intersection of traffic flows, including in the territories of Special Economic zones. The structure of the Center for Wholesale Trade and Distribution of Agricultural Products should probably include the activities of 8 state-controlled management and operating companies that can provide a number of services on preferential terms as part of the measures.

When implementing this initiative, it is necessary to take into account market conditions, the scale of suppliers and consumers during the construction of a wholesale distribution center for agricultural products in places of maximum concentration of industry and at the intersection of traffic flows, including in the territories of Special Economic zones.

The centers and regional mini-banks being created should first of all solve the basic, everyday problems and tasks of small agricultural producers who fill the market with agricultural products, including those that meet the needs of low-income segments of the population.[18].

Also, in order to successfully solve the problems of improving the efficiency of farms in the Russian Federation, it is advisable to develop and launch specialized online resources that are controlled by government agencies and integrated with the management systems of the Center for Wholesale Trade and Distribution of Automated Agricultural Products, through which consumers and suppliers can work effectively.

Distribution centers are becoming one of the branches of the food supply chain for the population, which ensures the effective functioning of the entire

ecosystem. When implementing state programs for the construction of infrastructure facilities in Russia, it is necessary to take into account possible joint business processes between objects of economic activity in the future, since the state can gradually form a nationwide supply chain for agricultural products. For public institutions on the territory of the Russian Federation and for the entire population as a whole. This system provides a basis for providing comprehensive monitoring and forecasting of the state of stability and development of local agricultural production entities, increasing the number of regional agro-industrial complex management bodies providing information services in the Internet space, and expanding coverage. regions by monitoring prices in the agri-food market.

Departmental organizations that stimulate the agricultural sector of the economy in various ways need to develop in advance schemes for the supply of agricultural products to budgetary organizations and create many regulatory legal acts regulating interaction between participants in economic activities, budgetary institutions and regulatory agencies.

In addition, taking into account the main strata of society, a clear State policy should be developed on issues related to the definition of state requirements for the provision of food to state structures.

Thus, the creation of online resources, as well as conditions and environments for effective communication, allows agricultural producers to sell their products directly in retail and wholesale trade relations, which is one of the most direct and effective solutions to pressing problems in our country.

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Article



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ECONOMETRIC MODELING OF FINAL DEMAND OF UZBEKISTAN

Abstract: In this article provides a review of applied macromodels for analyzing and forecasting demand, as well as its constituent segments of the CIS countries, as those closest to Uzbekistan in terms of development level and economic structure. At the same time, a methodology for constructing a macromodel of analysis has been developed and a formula for calculating the projected growth rate of final demand has been formulated. An econometric macromodel of final demand for goods and services has been constructed to analyze and forecast the macroeconomic equilibrium of the country. Also, econometric models of demand were tested for the statistical significance of indicators, assessed on statistical data from Uzbekistan, and an economic interpretation of the equations included in the macromodel of demand was given.

Key words: econometric modeling, macroeconomic equilibrium, demand for final goods and services, government expenditures, final consumption of households, expenditures of NPOSH, investments, net exports, assessment, economic interpretation, model testing.

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Introduction

The effectiveness of the state policy of ensuring macroeconomic balance is based on scientifically based research, including statistical modeling and forecasting for the adoption of administrative, legal, foreign policy and economic measures. In this regard, building macro models and forecasting demand and supply at any stage of economic development is of paramount importance for determining the level of macroeconomic balance and factors of sustainable development of the country.

It should be emphasized that in the conditions of globalization and instability of the world economy, in order to determine the level of balance of the national economy, it is necessary to develop new approaches to the construction of macro models of macroeconomic balance and to improve forecasting tools taking into account new external challenges and risks.

In addition, this requires the improvement of existing methodological recommendations for

building macro models and the development of new alternative approaches to modeling and forecasting macroeconomic indicators

Without diminishing the practical significance of the other approaches, it should be noted that the improvement of modeling and forecasting of the macroeconomic balance of the country on the basis of macro proportions and indicators of the system of national accounts is relevant and becomes important due to the need to implement mathematical and econometric tools in the practical activities of national statistics, which is specified in the National strategies for the development of statistics of the Republic of Uzbekistan for 2020-2025 [16].

In this regard, this study built a macro model of final demand as the main macro indicator of macroeconomic balance, along with the country's final supply.

Analysis of literature. The study of applied econometric models of demand analysis of the CIS countries, selected by us as the closest in terms of the

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level of development and structure of the economy, showed that there are few studies covered by the modeling of both demand and supply of goods and services at the same time.

Uzbek scientist S.V. Modeling the volume of supply and demand, Chepel included "indicators of industry output and investment (offer from domestic producers), as well as imports (offer from the world economy), and demand factors - income of the population and indicators of external demand (exports, GDP of Kazakhstan, money transfers from Russia to Uzbekistan)" [18].

Scientists from Belarus led by M.K. Kravtsov in the article "The econometric macro model for the analysis and forecasting of the most important indicators of the Belarusian economy modeled the volume of demand (gross domestic product) and presented how the factors influencing its final consumption of households and non-governmental organizations, state administration, gross accumulation and net export of goods and services" [8].

Russian science led by M.E. Mamonov. predicted as the resulting indicator the volume of the

gross domestic product (demand), and as a result of the factors affecting it, state and private expenditures on the education system of all levels and each level (primary, secondary and higher education) separately (% of GDP), the number of teachers in the calculation on the number of pupils, students, coverage of the population by primary, secondary and higher education (% of the population), the average number of years of education of the population aged 25-64 and 15-64, the share of graduates of technical and mathematical specialties, as well as graduates of pedagogical and medical universities in the total number of graduates of the higher education system, demographic indicators (life expectancy at birth and at the age of 20, 40 years, the overall mortality rate, various indicators of "quality of education", "quality of the workforce", cost indicators of human capital and indices of human capital [13].

Applied econometric models of analysis and forecasting of demand and its constituent segments are presented in Table 2.

Table 1. Applied econometric models of analysis and forecasting of demand and segments of its components

Resulting indicator	Factor	Research
Volume of demand (Gross domestic product)	- final consumption of households and NKOODH; - final consumption of state administration; - gross accumulation; - net export of goods and services.	Kravtsov M.K., Burdyko N.M., Gaspadarets O.I., Shynkevich N.N., Kartun A.M. (2008), [8]
Volume of demand	- salary (minimum salary rates are real, i.e. excluding inflation); - export; - retail turnover; - GDP of Kazakhstan; - money transfers from Russia to Uzbekistan (real rates excluding inflation); - devaluation amount.	Chepel S.V. (2019), [18]
GDP volume	- state and private expenditures on the education system at all levels and each level (primary, secondary, and higher education) separately (% of GDP); - the number of teachers based on the number of students [42]. - coverage of the population by primary, secondary and higher education (% of the population); the average number of years of education of the population aged 25-64 and 15-64; - shares of graduates of technical and mathematical specialties, as well as graduates of pedagogical and medical universities in the total number of graduates of the higher education system; - demographic indicators (expected life expectancy at birth and at the age of 20, 40 years; - general mortality rate; etc.) - various indicators of "quality of education", "quality of labor force"; - cost indicators of human capital; - indices of human capital.	Mamonov M.E., Pestova A.A., Sabelnikova E.M., Apokin A.Yu. (2015), [13]
GDP volume	- final consumption expenses; - gross fixed capital formation; - changes in inventories of working capital.	Zenkova, L.P., Novikov M.M. Page 91. (2019), [6]
GDP growth rate	- expenses of the expanded budget; - expenditures of the expanded budget for national defense and security; - spending of the extended budget on social policy; - expenditures of the extended budget on the national economy; - expenditures of the extended budget on health care; - expenses of the expanded budget for education; - the price of Urals oil (\$/barrel on average per hour).	Balaev A.I. (2018), [1]
GDP growth rate	- expenditures on national defense; - expenditures on national security and law enforcement activities; - expenses for education;	Kudrin A., Knobel A. (2017), [10].

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	- spending on health care and sports; - expenses for road infrastructure and transport.	
Economic growth	- state sector; - non-state sector.	U.A. Madrakhimov (2018), [12].
Final consumption of households and NKOODH	- monetary income of the population; - labor productivity; - tariff rate of the first category; - the average number of employed workers; - accumulation of savings in deposits, securities, balance of purchase and sale of foreign currency.	Kravtsov M.K., Burdyko N.M., Gaspadarets O.I., Shynkevich N.N., Kartun A.M. (2008), [8].
Household final consumption	- average per capita monetary income of the population (rub. / person); - average per capita monetary expenditure of the population (rub. / person); - average monthly nominal accrued wages of employees of organizations (rub.); - the average size of assigned pensions (rub.); - the specific weight of the household expenses for the payment of housing and communal services (%); - number of economically active population (number); - the number of enterprises and organizations (quantity); - the cost of a fixed set of consumer goods and services (rub.); - the total area of residential premises on average per 1 inhabitant m2.	Govryakova M.A. (2020) [4].
Consumer spending of households on food products on average per person (rubles) per hour	- the number of economically active population (thousands of people); - households with a personal computer and access to the Internet (as a percentage of the total number of households); - turnover of retail trade per capita (rubles); - average monthly nominal accrued salary (rubles); - volume of household services per capita (rubles); - volume of paid services per capita (rubles); - volume of housing and communal services per capita (rubles).	Maslyukova E.V., Pironko E.V. (2015), [14].
Final consumption of state administration	-tax revenue to the budget; - number of people employed in the public sector of the economy; -expenses of the consolidated budget; - tariff rate; - changes in prices for natural gas and crude oil imported from Russia for government final consumption.	Kravtsov M.K., Burdyko N.M., Gaspadarets O.I., Shynkevich N.N., Kartun A.M. (2008), [8].
The volume of state expenditures	- gross domestic product.	Kochikin I.V. (2019), [7].
Gross accumulation	GDP with lag (-1). To forecast the gross accumulation, it is proposed to use the model of the flexible accelerator of the investment process, the essence of which is the dependence of the gross accumulation on GDP with a lag (-1).	Kravtsov M.K., Burdyko N.M., Gaspadarets O.I., Shynkevich N.N., Kartun A.M. (2008), [8]
Investments	today's and tomorrow's consumption; - net profit (constant); - rate of dividend payments from profit; - net investments; - rate of return on investments (constant); - volume of attracted loans; - interest on loans.	Mytsek S.A., Mytsek E.B. (2009), [15].
Investments in fixed assets	- the logarithm of budget funds, at the expense of which investments are financed; - the logarithm of loans directed to investments in fixed assets, in constant prices of 2008; - profit of organizations in constant prices; - profit tax paid by organizations at constant prices; - the real interest rate on loans issued to non-financial organizations for a period of more than 1 year.	Bukina I.S., Manevich V.E. (2014), [3].
Volume of FDI	market size of the host country; - transport opportunities; - information infrastructure; - level of inflation; - level of education; - tariff rate; - cost of labor resources.	Chukavina K.V., Zhukov A.N., Reshetova Y.M. (2016), [19].
Investments in fixed capital, growth rate %	- the number of insurance organizations per 1,000 people; - insurance premiums per 1,000 rubles of household income, %; - specific weight of unprofitable organizations, %; - volume of deposits of legal entities per 100 rubles of household income, growth rate %; - amount of bank assets for 100 thousand человек, тем роста %; - financial result, growth rate %; X7 - population income, growth rate %.	Krapvyvina T. A. (2016), [9].
Growth rate of the physical volume of GRP	- the growth rate of the average annual number of people employed in the economy; - rate of growth of the physical volume (further — FD) of agricultural production; - the rate of increase in the FD production of industrial production; - rate of growth of retail trade turnover; - rate of growth of FD of paid services of the population; - growth rate of FD investments in fixed capital.	Kukarskaya, L. I. (2013), [11].

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Pure export of goods and services	- export of goods; - import of goods; - changes in crude oil and natural gas import prices; - export of services; - import of services - monetary income of the population; - the nominal exchange rate of the Belarusian ruble against the US dollar; - ruble money supply (M2); - energy intensity of GDP; - level of prices; - real income; - indicator of profitability from various assets, alternative to cash.	Kravtsov M.K., Burdyko N.M., Gaspadarets O.I., Shynkevich N.N., Kartun A.M. (2008), [8].
Net exports of goods	- commercial freight turnover of transport (billion ton-km); - unemployment rate at the age of 15-72 years (%); - average producer prices for crude oil (rubles per ton); - average producer prices for coal (rubles per ton).	Shirnaeva S.Yu. (2021), [17].
Export value of goods	- the ratio of domestic and export prices; - gross output of export-oriented industries (sum of products of the fuel, metallurgical, chemical, forestry, woodworking and pulp and paper industries);	Emelyanov S.S. (2007), [5].
Volume of exports of goods and services	- logarithm of the volume of gross domestic product. - logarithm of the volume of cash expenditures of the population on final consumption. - logarithm of the volume of gross fixed capital formation. - logarithm of US Brent oil price. - logarithm of the real exchange rate.	Belova T.A. (2016), [2].
Cost of importing goods	- the ratio of domestic and import prices for consumer and investment goods;- volume of gross domestic product (GDP) used.	Emelyanov S.S. (2007), [5].
Volume of imports of goods and services	- logarithm of the volume of gross domestic product; - logarithm of the volume of cash expenditures of the population on final consumption; - logarithm of the volume of gross fixed capital formation; - logarithm of the US Brent oil price; - logarithm of the real exchange rate.	Belova T.A. (2016), [2].

Source: compiled by the authors.

Research methodology. In the methodological aspect, building an econometric macro model for analyzing and forecasting the final demand of the country requires their development sequentially in the following order:

- modeling of individual segments (factors influencing it) of final demand;
- formation of an econometric model of final demand;
- evaluating models using statistical data from Uzbekistan.

The macro model of final demand will be based on the well-known SNA equation, according to which GDP (final demand) is calculated by the final use method.

Thus, the growth rate of final demand will be determined by adding the multiplied growth rate of factors and their shares in final demand, excluding the contribution of imports, and will take the following form of a mathematical formula:

$$AD_gr(GDPd) = HCONS_gr * Hcons_d + GOV_CONS_gr * Gov_cons_d + INV_grFC * Inv_d + EXP_gr * Exp_d - IMP_gr * Imp_d \quad (1)$$

Where,

- AD_gr (GDPd) - growth rate of final demand;
- HCONS_gr - growth rate of household expenditures;
- Hcons_d is the share of household expenditures in GDP (calculated using the expenditure method);
- GOV_CONS_gr - growth rate of government expenditures;
- Gov_cons_d - share of government expenditures in GDP;
- INV_grFC - growth rate of investments in fixed assets;
- Inv_d - share of investment in fixed capital in GDP;
- EXP_gr - growth rate of exports of goods and services;
- Exp_d - share of exports of goods and services in GDP;

IMP_gr - growth rate of imports of goods and services;

Imp_d is the share of imports of goods and services in GDP.

Results of simulation. Based on theoretical and applied approaches, construction of an econometric model of final demand as factors of the growth rate of household expenditures (HCONS_2) (gross output growth rate (OUTPUT), inflation growth rate (DEF_GDP), growth rate of total income per capita (GREV_PC), rate of change exchange rate of the national currency (USD per sum) (EXCH_R), rate of change in the average refinancing rate of the Central Bank of Uzbekistan (INT_R), growth rate of government expenditures (GOV_CONS) (growth rate of gross output (OUTPUT), producer price index of industrial goods (PPI)), inflation growth rate

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(DEF_GDP), growth rate of exports of goods and services (EXP), gold price change rate (GOLD_P), gas price change rate (NG_P), investment growth rate (INV_grFC) (gross output growth rate (OUTPUT), rate of change in the average refinancing rate of the Central Bank of Uzbekistan (INT_R*), inflation growth rate (GDP deflator) (DEF_GDP), industrial producer price index (PPI)), growth rate of exports of goods and services (EXP), consumer price index (CPI), import of goods and services (IMP), rate of change in the national currency exchange rate (USD). US per sum) (EXCH_R), rate of change in gold prices (GOLD_P), rate of change in gas prices (NG_P), growth rate of Russian GDP (RUS_GDP_G), growth rate of China's GDP (CHN_GDP_G), growth rate of imports of goods and services (IMP) (gross output growth rate (OUTPUT), export growth rate (EXP), rate of change in the average refinancing rate of the

Central Bank of Uzbekistan (INT_R*), inflation growth rate (GDP deflator) (DEF_GDP), industrial producer price index (PPI)) were included several dozen indicators and optimal variants of models were identified in segments with a denser relationship with the resulting values.

When testing econometric models of demand, in particular, the model of the growth rate of household expenditures (Annex 1.), the growth rate of government expenditures (Annex 2.), the growth rate of investment (Annex 3.), the growth rate of exports of goods and services (Annex 4 .), the growth rate of imports of goods and services (Annex 5.) estimated on the statistical data of Uzbekistan had statistically significant indicators.

Econometric models of demand analyzed using statistical data from Uzbekistan and assessed as “satisfactory” are presented in Table 2.

Table 2. A system of econometric demand models assessed using statistical data from Uzbekistan

Econometric models	Variables indicators
Household Expenditure Growth Rate	
$HCONS_gr = -0,392 + 1,307 * OUTPUT - 0,191 * DEF_GDP + 0,236 * GREV_PC$ (0,0026) (0,000) (0,000)	HCONS_gr - growth rate of household expenditures; OUTPUT – growth rate of gross output; GREV_PC_2YL - growth rate of total income per capita, with a two-year lag; DEF_GDP – inflation growth rate (GDP deflator).
Government Expenditure Growth Rate	
$GOV_CONS_gr = (-0,252) + 0,723 * OUTPUT + 0,134 * DEF_GDP + (-0,143) * PPI + 0,414 * GDP_PC_gr_2YM + 0,104 * SAV_2YM$ (0,0690) (0,0057) (0,0224) (0,0964) (0,0737)	GOV_CONS - growth rate of government expenditures; OUTPUT – growth rate of gross output; DEF_GDP – inflation growth rate (GDP deflator); PPI – producer price index for industrial goods; GDP_PC_gr_2YM - growth rate of GDP per capita, smoothing two annual values; SAV_2YM - GFCF growth rate, smoothing two annual values.
Investment growth rate	
$INV_grFC = -1,148 + 2,144 * IND_VA_gr + 0,246 * INT_R + 0,255 * GREV_PC_2YL - 0,509 * EXP_1YL$ (0,0001) (0,0016) (0,0044) (0,0001)	INV_grFC - growth rate of investments in fixed assets; IND_VA_gr - growth rate of industry GVA; INT_R* - rate of change in the average refinancing rate of the Central Bank of Uzbekistan. EXP_1YL - export of goods and services, with a one-year lag; GREV_PC_2YL is the growth rate of total income per capita, with a two-year lag.
Growth rate of exports of goods and services	
$EXP_gr = (-0,342) + 0,786 * RUS_GDP_gr + 0,489 * IMP + 0,274 * DEF_GDP - 0,209 * GREV_PC$ (0,0083) (0,0002) (0,0001) (0,0049)	EXP_gr - growth rate of exports of goods and services; RUS_GDP_gr - Russian GDP growth rate; IMP is the growth rate of imports of goods and services; DEF_GDP – GDP deflator growth rate; GREV_PC is the growth rate of total income per capita.
Growth rate of imports of goods and services	
$IMP_gr = 0,074 + 0,586 * EXP_3YM + 0,319 * INT_R_3YM + 0,317 * CPI_3YM - 0,230 * PPI_1YL$ (0,0001) (0,0008) (0,0179) (0,0476)	IMP_gr - growth rate of imports of goods and services; EXP_3YM - export of goods and services, smoothing three annual values; PPI_1YL – producer price index for industrial goods, with a one-year lag; INT_R_3YM - rate of change in the average Central Bank refinancing rate, smoothing three annual values. CPI_3YM – consumer price index (CPI), smoothing three annual values.
Source: compiled by the authors.	

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The economic interpretation of the above equations included in the macro model of demand is as follows:

- The growth rate of household expenditure is largely determined by the gross volume of national output, the elasticity coefficient for the growth rate of gross output (OUTPUT) is 1.307. An increase in inflation (according to the GDP deflator) by 1% causes a decrease in final household consumption by 0.191%, and the growth rate of total per capita income (GREV_PC) increases consumer spending by 0.236%.

- The growth rate of government expenditures (GOV_CONS) is directly related to the growth of gross output, which in the model (in the equation) is reflected in the elasticity coefficient of the growth rate of gross output, which is equal to 0.723. An increase in producer prices of industrial goods (PPI) by 1% causes a decrease in the growth rate of government spending by 0.143%, and the growth rate of GDP per capita (GDP_PC_gr), gross fixed capital formation (SAV), GDP deflator (DEF_GDP) by 1% increases government spending by 0.414, 0.104 and 0.134%, respectively.

- The growth rate of investment in fixed capital (INV_grFC) is determined by the growth rate of industry GVA (IND_VA_gr), total income per capita (GREV_PC) and the change in the average refinancing rate of the Central Bank of Uzbekistan (INT_R*), which is reflected in the elasticity coefficients in the equation equal to 2.144, 0.255 and 0.246 respectively. At the same time, a 1% increase in exports of goods and services causes a 0.509% decrease in the growth rate of investment in fixed capital (INV_grFC), which is a very significant indicator.

- An increase of 1% in the growth rate of Russia's GDP (RUS_GDP_gr) and import of goods and services (IMP) as exogenous values, the growth rate of the GDP deflator as an endogenous factor, leads to an increase in exports of goods and services (EXP) by 0.786%, 0.489% and 0.274 % respectively. At the

same time, a 1% increase in total per capita income (GREV_PC) will lead to a 0.209% decrease in the growth rate of exports of goods and services (EXP_gr).

- The growth rate of exports of goods and services (EXP), the rate of change in the average refinancing rate of the Central Bank of Uzbekistan (INT_R_), the rate of change in the consumer price index (CPI) by 1% leads to an increase in imports of goods and services by 0.586%, 0.319% and 0.317% , respectively, and a 1% increase in the industrial goods producer price index (PPI) leads to its decrease by 0.230%.

Conclusion. Summarizing the results of the above research, it is necessary to note the following conclusions.

First, the regression statistical characteristic (expressed in terms of multiple R, R - square, normalized R - square, SER - standard error of regression, F - statistics, p - value of F - statistics and others) of econometric models of household expenditures and public administration , investments, exports and imports of goods and services assessed on statistical data of Uzbekistan from 1995 to 2022, indicate the statistical significance of model indicators, which allow us to confidently say that they can be used to predict the values of the country's macroeconomic equilibrium.

Secondly, modeling the growth rate of household and government expenditures, investments, exports and imports of goods and services is based on a study of theoretical and applied indicators, covering the largest amount of metadata generated in national statistics, by expanding the range of indicators of the regression equation through the prism of logical thinking about the influence of segments on the economic process indicates the scientific validity of the structure of the econometric model of final demand, which allows its use in an analytical study of the dynamics of development of demand factors and drawing up programs for the socio-economic development of the Republic of Uzbekistan.

Annex 1. Regression statistical characteristics of the econometric model of household expenditures

CONCLUSION OF RESULTS

Regression statistics

Multiple R	0,894
R-squared	0,800
Normalized R-squared	0,774
Standard error	0,034
Observations	27

Analysis of variance

	df	SS	MS	F	Significance F
Regression	3	0,108	0,036	30,687	0,000
Balance	23	0,027	0,001		

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Total	26	0,135				
	Coefficients	Standard Error	t-statistic	P-Value	Lower 95%	Upper 95%
Y-HCONS	-0,392	0,429	-0,914	0,370	-1,279	0,495
X 1-OUTPUT	1,307	0,388	3,370	0,003	0,505	2,109
X 2-DEF_GDP	- 0,191	0,028	-6,723	0,000	-0,249	-0,132
X 3-GREV_PC	0,236	0,044	5,369	0,000	0,145	0,327

Annex 2. Regression statistical characteristics of the econometric model of government expenditures

CONCLUSION OF RESULTS

Regression statistics

Multiple R	0,789
R-squared	0,623
Normalized R-squared	0,538
Standard error	0,027
Observations	28

Analysis of variance

	df	SS	MS	F	Significance F
Regression	5	0,027	0,005	7,277	0,000
Balance	22	0,016	0,001		
Total	27	0,043			

	Coefficients	Standard Error	t-statistic	P-Value	Lower 95%	Upper 95%
Y-GOV_CONS	-0,252	0,356	-0,709	0,486	-0,990	0,486
X 1-OUTPUT	0,723	0,378	1,912	0,069	-0,061	1,507
X 2-DEF_GDP	0,134	0,044	3,063	0,006	0,043	0,224
X 3-PPI	-0,143	0,058	-2,456	0,022	-0,264	-0,022
X 4-GDP PC_gr_2YM	0,414	0,238	1,737	0,096	-0,080	0,908
X 5-SAV_2YM	0,104	0,055	1,878	0,074	-0,011	0,218

Annex 3. Regression statistical characteristics of the econometric investment model

CONCLUSION OF RESULTS

Regression statistics

Multiple R	0,880
R-squared	0,775
Normalized R-squared	0,732
Standard error	0,057
Observations	26

Analysis of variance

	df	SS	MS	F	Significance F
Regression	4	0,231	0,058	18,042	0,000
Balance	21	0,067	0,003		
Total	25	0,299			

	Coefficients	Standard Error	t-statistic	P-Value	Lower 95%	Upper 95%
Y-INV_grFC	-1,148	0,571	-2,010	0,057	-2,335	0,040
X 1 - IND_Vagr	2,144	0,446	4,808	0,000	1,217	3,071
X 2 - INT_R	0,246	0,068	3,617	0,002	0,104	0,387
X 2 - GREV_PC_2YL	0,255	0,080	3,186	0,004	0,088	0,421
X 4 - EXP_1YL	-0,509	0,112	-4,545	0,000	-0,742	-0,276

Annex 4. Regression statistical characteristics of the econometric model of exports of goods and services

CONCLUSION OF RESULTS

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Regression statistics						
Multiple R	0,902					
R-squared	0,813					
Normalized R-squared	0,777					
Standard error	0,038					
Observations	26					
Analysis of variance						
	df	SS	MS	F	Significance F	
Regression	4	0,130	0,032	22,839	0,000	
Balance	21	0,030	0,001			
Total	25	0,160				
	Coefficients	Standard Error	t-statistic	P-Value	Lower 95%	Upper 95%
Y-EXP_3YM	-0,342	0,272	-1,256	0,223	-0,907	0,224
X 1-RUS_GDP_3YM	0,786	0,270	2,915	0,008	0,225	1,346
X 2-IMP_3YM	0,489	0,107	4,580	0,000	0,267	0,711
X 3-DEF_GDP_3YM	0,274	0,055	4,952	0,000	0,159	0,390
X 4-GREV_PC	-0,209	0,066	-3,146	0,005	-0,347	-0,071

Annex 5. Regression statistical characteristics of the econometric model of import of goods and services

CONCLUSION OF RESULTS

Regression statistics						
Multiple R	0,866					
R-squared	0,751					
Normalized R-squared	0,705					
Standard error	0,044					
Observations	27					
Analysis of variance						
	df	SS	MS	F	Significance F	
Regression	4	0,127	0,032	16,568	0,000	
Balance	22	0,042	0,002			
Total	26	0,170				
	Coefficients	Standard Error	t-statistic	P-Value	Lower 95%	Upper 95%
Y-Imp_3YM	0,074	0,159	0,465	0,646	-0,256	0,404
X1_PPI_1YL	-0,230	0,110	-2,098	0,048	-0,458	-0,003
X2_EXP_3YM	0,586	0,123	4,776	0,000	0,332	0,841
X3_INT_R_3YM	0,319	0,082	3,906	0,001	0,149	0,488
X4_CPI_3YM	0,317	0,124	2,559	0,018	0,060	0,573

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Article



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THE DEVELOPMENT OF AN ACCESS CONTROL SYSTEM BASED ON CONTACTLESS ID CARD READING TECHNOLOGY

Abstract: This article analyzes the directions of development of an access control system based on contactless ID card reading technology. The advantages and disadvantages of using contactless ID cards are also analyzed. In addition, our study presents conclusions and recommendations on the development of an access control system based on contactless ID card reading technology. Moreover, conclusions and recommendations are given on the development of an input control system based on contact card reading technology.

Key words: contactless ID card, reading technology, RFID cards, vulnerability of contactless cards.

Language: English

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Introduction

An access card is a user ID that contains some information - a key that opens a door or access to resources. It is difficult to imagine the modern world without contactless identification technologies. The use of bank cards (magnetic stripe cards, EMV chip cards, contactless payments PayPass, payWave); RFID cards for transport, entertainment and loyalty programs: issuance of a compulsory medical insurance policy and social cards in Moscow, and, of course, cards of physical and logical access to a computer and IT resources of the company, widespread use access cards. However, the "card" is a generally accepted concept, since the identifier key can be in the form of a key fob, tag, etc. Mobile phones or other devices that support NFC technology are not slow and are used as an identifier.

For this reason, the issue of data transfer security from the identifier to the reader is more relevant than ever. The risk of copying data from cards and cloning them increases every day, which makes it necessary to take a more conscious approach to choosing technologies that ensure secure identification. This:

Firstly, vulnerability is usually assessed by the three main threats identified when working with contactless cards: data privacy, duplication of access cards and cloning.

Secondly, the unreliability of confidential information, if the identifier is stored in plain text and is not protected from any reading, makes the access card and the entire system the most vulnerable, allowing attackers to gain access not only to the object, but also to data about the cardholder. The problem is solved using DES, 3DES, and AES encryption algorithms. We have developed the following conclusions and recommendations for the development of an access control system based on contactless ID card reading technology:

Firstly, the reading range, as well as the possibility of using it in a very wide range from 0 (contact access cards) to 300 meters (active contactless cards).

Secondly, two technologies are often used as additional protection on joint access cards, and the leading technology in the ACS segment is undoubtedly the development of RIFD (Radio

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Frequency Identification), a radio frequency identification system that provides quick access to the system without requiring the exact position of the tag. In addition, RIFD cards allow you to work in harsh conditions, carry out remote identification and have a long service life.

Preventing unauthorized persons from entering the restricted area by electronic means was a vital approach to securing the area. Over time, a number of access control methods have developed, each with its own advantages and disadvantages. The biometric access control method extracts the physiological and behavioral characteristics of a person to perform human recognition.

These characteristics include: fingerprint, hand geometry, handwriting, handprint, iris, palm veins, voice and retina. These characteristics have been the subject of many studies to provide human identification and access control functions. In [1], a system for identifying a person by finger veins was introduced, which can be used to control access. A simple pattern matching method has been used to reduce computation time for embedded environments, but the success rate is 97.6% and therefore not suitable for personal security.

A technique for recognizing veins and finger textures based on multiple line tracking; the Gabor filter and neural network were proposed in [2], they can be cost-effective and more accurate than some algorithms, however, long computing time limits their use. In [3], a device for palm vein authentication using

blood vessel patterns as a personal identification factor was presented. Although it has a high level of accuracy, false acceptance and false rejection are still a problem.

Methods. A card reader is a data entry device that reads data from a media in the form of a card. The first were punch card readers that read paper or cardboard punch cards, which were used during the first few decades of the computer industry to store information and programs for computer systems. Modern card readers are electronic devices that can read plastic cards with a built-in barcode, magnetic stripe, computer chip or other information carrier. A smart card reader is an electronic device that reads smart cards and can be found in the following form [6]:

Some keyboards have a built-in card reader.

- For personal computers (PCs), there are external devices and card readers of the internal drive compartment.

- Some laptop models contain a built-in smart card reader and/or use an updatable firmware using flash memory.

External devices that can read a personal identification number (PIN) or other information can also be connected to a keyboard (commonly referred to as "PIN pad card readers"). This model works by supplying an integrated circuit on a smart card with electricity and exchanging data via protocols, which allows the user to read and write to a fixed address on the card [7].

Table 1. Data transfer protocols

Name	Description
T=0	A byte-level asynchronous half-duplex transmission protocol defined in ISO/IEC 7816-3.
T=1	Asynchronous half-duplex transmission protocol at the block level, defined in ISO/IEC 7816-3.
T=2	Reserved for future use.
T=3	Reserved for future use.
Contactless	Contactless APDU transmission via an ISO/IEC 14443 contactless interface.

Analysis of the relevant literature

Magnetic stripe. The magnetic stripe technology, commonly referred to as "mag-stripe", is so named because of the strip of magnetic oxide tape laminated onto the card. There are three data tracks on the magnetic stripe. Usually, the data on each track corresponds to a certain encoding standard, but any format can be encoded on any track. A magnetic stripe card is cheap compared to cards of other technologies and is easy to program. A magnetic stripe contains more data than a barcode in the same space. Although it is more difficult to create a magnetic stripe than a barcode, the technology of reading and encoding data on a magnetic stripe is widespread and easy to acquire. Magnetic stripe technology is also prone to incorrect reading, card wear and data corruption. These cards

are also subject to some forms of skimming, when external devices are placed above the reader to intercept the data being read [8].

Wiegand Map. Wiegand Card Technology is a proprietary technology that uses embedded ferromagnetic wires strategically positioned to create a unique pattern that generates an identification number. Similar to magnetic stripe or barcode technologies, this card must be passed through a reader in order to be read. Unlike other technologies, the identification carrier is embedded in the card and is not subject to wear. This technology once gained popularity because it is difficult to reproduce, which creates a high level of security. However, this technology is being replaced by contactless cards due to a limited supply source, the relatively better

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resistance of contactless readers to hacking, and the convenience of contactless functions in contactless readers.

Proximity card readers are still called "Wiegand readers", but no longer use the Wiegand effect. Proximity technology preserves Wiegand upstream data so that new readers are compatible with older systems.

Proximity Card. The reader emits an electric field around itself ranging in size from 1 to 20 inches. The cards use a simple LC scheme. When the card is brought to the reader, the electric field of the reader excites the coil in the card. The coil charges the capacitor and, in turn, powers the integrated circuit. The integrated circuit outputs the card number to the coil, which transmits it to the reader [9].

Access Control Server. Each access control system needs a server where permissions are stored in the access database. Thus, it acts as the center or "brain" of the access control system. In fact, it is the server that decides whether the door should open or not by matching the submitted credentials with the credentials authorized for that door. The server can be a dedicated Windows or Linux local computer, a cloud server, or even a decentralized server (when permissions are stored in a door reader). The server also monitors and records access-related actions and events, and allows administrators to receive reports on past events with data for a specified period of time. If a local access control server is used, there is usually a dedicated machine running the access software. It requires the presence of an administrator on site to manage it. Because there is a need to deal with multiple locks.

Discussion of the results. In the form of credit cards and SIM cards, smart cards are the most common form of IT computing power on the planet.

It is estimated that there are between 30 and 50 billion smart cards in circulation today.

The smart card has a built-in microprocessor or memory chip with the processing power needed to serve a variety of different applications in combination with a smart card reader.

Over the past three decades, these tools, more than any other technology, have quietly transported us all into the virtual world.

- Smart credit cards provide trillions of dollars worth of daily transactions.
- SIM cards facilitate billions of conversations that link together our social and economic worlds.

• As an access control device, smart cards (company badges, university IDs) make personal and business data available only to the relevant users.

• Like a national eID card, a smart health card, a residence permit or an electronic passport, smart card technology offers more reliable identification and authentication tools for the benefit of both authorities and citizens.

Confirmations

Electronic identifiers. An electronic identification card (e-ID) performs various roles: it acts as a traditional means of identification, a travel document and, finally, a key to access citizen's data.

There are many international rules and standards regarding electronic identity cards, most of which are applied by States.

The public has become accustomed to computerized smart cards due to their use in the banking system, and as a result, their reliability is no longer in doubt.

National ID cards are now also used to access a range of services that were previously difficult to synchronize.

An electronic identity card (also known as a computerized national identity card) can be used for identification, authentication and electronic signature. Thus, this system makes it possible to simplify several previously complex ways of transmitting information.

If the card is a multi-application card that supports, for example, debit and credit and stored value, the customer will not want to throw away this type of card. It would be more appropriate if the application with the saved values was reloadable. This process is sometimes referred to as "post-release".

Smart Card Alliance. The Smart Card Forum is a group of various industries and government groups, many of which seem to have competing interests.

Today, even competing organizations agree that when it comes to new technologies, industry-wide efforts are required to create a workable infrastructure and develop compatible, interoperable, multi-purpose systems. This effort cannot be carried out on any meaningful scale by individual players acting in their own interests.

To date, the Forum has made great strides in establishing links between industries and the public sector, as well as in encouraging various trials demonstrating the viability of smart card-based payment and information systems.

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ASSESSMENT OF STRUCTURAL CHANGES IN THE AGRICULTURAL NETWORK BY STATISTICAL METHODS

Abstract: In this article, a scientific proposal and practical recommendations have been developed regarding the statistical evaluation of the structural changes in the agricultural sector of the Republic of Uzbekistan and the determination of their prospects. Also, based on the specific characteristics of the country, the system of indicators for the comprehensive statistical evaluation of the agricultural sector was analyzed, using the indicators that evaluate the structural changes in the economic activity of agricultural entities.

Key words: agriculture, structural changes, statistics, evaluation, perspective, agrarian sector, system of statistical indicators, analysis, innovation, food industry, water industry, agricultural industry.

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Introduction

In the context of intensifying global competition in the world, the importance of the processing industries and the agricultural sector, which meets the needs of the population for agricultural raw materials and food products, is increasing.

According to statistical data, "today, world agriculture is economically active population of 1 billion. It provides employment for more than 100,000 people, and about 5% of the total products produced in the world are contributed by this industry. Forecast data shows that by 2050, the world's population will reach 9.1 billion. can reach a person.

In this case, the demand for meat and dairy products of the world population is expected to increase by 2.5-3.0 times compared to today. In this process, according to the experiences of the countries of the European Union, the USA, Japan and Israel, the development of the activities of farms specializing in the sector, increasing their economic efficiency, introducing advanced innovations, ensuring the implementation of state programs adopted through economic and statistical research of the sector, their systematic formation, clustering of the agrarian sector Farming is being carried out in modern forms such as.

The occurrence of global instability in the world requires paying special attention to the study of problems related to food security and conducting extended scientific research in this regard.

In these studies, development of the strategy of economic development of the agrarian sector, ensuring the proportionality of the growth of the population and demands with the increase in the production volume of agricultural products, sustainable development of the agrarian sector, specialization of production processes, increasing the level of economic efficiency of economic entities through the use of modern innovative technologies and methods, comprehensive statistical research of the factors affecting their activity, ensuring their competitiveness appear as the priority directions of scientific research in this regard.

In Uzbekistan, the agrarian sector serves to increase the country's export potential while ensuring the population's demand for food and agricultural products, and over the past years special attention has been paid to the promotion and development of specialized farms.

In particular, in the Development Strategy of New Uzbekistan in 2022-2026, "...one of the most

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priority tasks to be implemented within the framework of the development strategy is to fundamentally increase and diversify the efficiency of agriculture for the development of the national economy, that is, to develop the agrarian sector, to process agricultural products on a cluster basis and priority tasks such as ensuring food security, improving the standard and quality of life of the population living in rural areas, creating the necessary conditions for doubling the income of farmers and peasants, and bringing the annual growth rate of agriculture to at least 5%.

Effective implementation of these tasks requires economic-statistical analysis of structural changes of agricultural sector farms, comprehensive statistical assessment of factors affecting their development, development of scientific proposals and recommendations based on medium-term forecasting of development prospects.

Analysis of literature on the subject

PF-60 of the President of the Republic of Uzbekistan dated January 28, 2022 "On the Development Strategy of New Uzbekistan in 2022-2026", PF-5853 of October 23, 2019 "On Approval of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030" decrees of June 7, 2022 "On additional measures to effectively organize the implementation of the tasks set in the strategy for the development of agriculture of the Republic of Uzbekistan for 2020-2030", Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 104 of February 26, 2021 "Statistics in the field of agriculture serves to a certain extent in the implementation of the tasks defined in the decision "On measures to expand and improve the database" and other regulatory legal documents related to the field.

Farms, peasant (personal assistant) farms and enterprises performing agricultural activities operate in the agricultural sector in our country (Fig. 1).

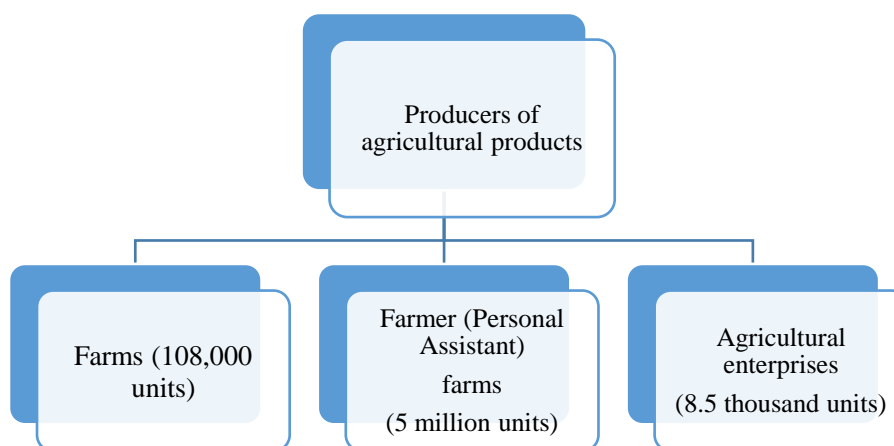


Figure 1. Types of producers of agricultural products in the Republic of Uzbekistan (as of January 1, 2022)

At a time when serious negative effects on the well-being of the population are being observed due to various crises that put the developed countries in economic disadvantageous situations in the countries with developed agricultural sector, the positive state of the level of well-being of people's life is maintained. This shows that the agricultural sector is gaining the most importance in all countries at the present time.

The development of the agricultural network creates the basis for the development of the processing system in the country by growing environmentally friendly products in the network. In addition, it serves to increase the number of jobs for rural residents. Based on these, due to the serious problems related to the global economic crisis that is still ongoing in the world, the sharp decrease in the volume of gross demand in the world market, the strengthening of competition in serious indicators, the qualitative

structural change of our national economy and the deepening of the diversification of industries, supporting multi-sectoral production and service activities - support, ensuring employment by creating new jobs, requiring the introduction of the most effective and systematic ways of improving the income and well-being of the population in our country.

The agricultural sector is one of the most important sectors of the economy of Uzbekistan, which serves to ensure the stability of Uzbekistan's export potential in foreign trade processes, as well as being a source of raw materials for food products, processing industry and service sectors of the population of our country.

Research methodology

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Table 1 below shows the changes in agricultural products and cultivated areas of our country over the years.

Table 1. Changes in agricultural products and cultivated areas of the Republic of Uzbekistan over the years.

Indicators	2000	2005	2010	2015	2020	2021
Cultivated area, thousand hectares	3778,3	3647,5	3708,4	3694,2	3396,1	3260,7
Agricultural products, at the current price, bln. soum	1387,2	5978,3	30856,7	99604,6	250250,6	303415,5

According to the end of 2021, the total volume of products (services) produced by agriculture, forestry and fisheries is 317781.6 billion. made up soum. According to the results of 2017, agriculture accounted for 19.7 percent of the GDP, and in 2021, this figure will be 26.9 percent, and the impact on the absolute growth rate of GDP will be 1.1 p.p. organized the Agrarian industry achieved such growth rates mainly due to meat (104.8%), vegetables (104.1%), potatoes (104.7%), grapes (105.5%), caught fish (120.7%) it can be seen that the growth rate has been positively affected. In terms of regions, the highest share was observed in Jizzakh region (53.4%), the lowest share was observed in Navoi region (15.0%).

Table 1 shows the changes in the volume of products grown with cultivated areas, in which it can be observed that the production of agricultural products has increased over the years and the cultivated areas have decreased. According to the end of 2021, the sector of small business and private entrepreneurship made up 96.7% of the network, and the highest share in this region was Jizzakh (99.1%), Kashkadarya (99.1%), Bukhara (98.1%) and Khorezm (98.1%) regions.

Analysis and results

Table 2 below shows the growth dynamics of agricultural products in the regions of Uzbekistan compared to last year.

Table 2. Dynamics of growth of agricultural products on the scale of the regions of the Republic of Uzbekistan compared to last year, in percent.

Areas	2000	2005	2010	2015	2020	2021
Total	103,1	105,4	106,3	106,1	102,7	103,9
Karakalpakstan Resp.	65,6	104,6	121,3	109,8	102,3	104,2
Andijan region	110,2	104,7	108,0	106,3	101,1	104,5
Bukhara region	106,3	109,2	107,6	107,1	101,9	104,7
Jizzakh region	100,1	104	106,4	106,7	102,7	104,2
Kashkadarya region	89,4	109,6	107,0	106,1	103,7	101,3
Navoi region	105,0	107,5	105,9	106,6	103,3	104,4
Namangan region	111,5	103,1	105,8	106,3	104,0	107,0
Samarkand region	104,8	103,9	107,0	107,1	102,5	103,1
Surkhandarya region	106,7	100,5	105,2	106,3	105,3	104,2
Syrdarya region	101,9	112,9	105,6	105,5	101,8	103,8
Tashkent region	114,9	103,8	102,9	103,3	100,1	104,1
Fergana region	113,5	107,2	106,1	105,7	104,9	103,2
Khorezm region	82,8	103,2	102,5	105,5	101,7	102,9

Agriculture accounted for 49.9 percent of agricultural production, and livestock farming for 50.1 percent. It can be seen that cultivation of agricultural products in Andijan region had the highest share (61.9%, 38.1%), while Navoi region had the lowest share (34.2%, 65.8%).

Agricultural products grown in our country are distributed in the form of the share of peasant (personal assistant) farms (65.9%), the share of farms (29.3%), and the share of organizations engaged in agricultural activities (4.8%).

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Table 3. Cultivated in agriculture of the Republic of Uzbekistan dynamics of products, in thousand tons.

Product type	2000	2005	2010	2015	2020	2021
Cereals and legumes	4 101,4	6 540,9	7 504,3	8 173,5	7 636,0	7 634,6
Potatoes	731,1	924,2	1 694,8	2 586,8	3 143,8	3 285,6
Vegetables - total	2 644,7	3 517,5	6 262,4	9 390,0	10 431,4	10 850,2
Food policy	451,4	615,3	1 182,4	1 853,6	2 134,4	2 285,3
Fruits and berries	790,9	949,3	1 676,3	2 467,9	2 812,6	2 852,6
Grapes	624,2	641,6	979,3	1 518,2	1 606,9	1 695,3
Cattle and poultry for slaughter (live weight)	841,8	1 061,5	1 461,4	2 033,4	2 519,6	2 635,1
Milk	3 632,5	4 554,9	6 169,0	9 027,8	10 976,9	11 274,2
Obtained eggs, mln. piece	1 254,4	1 966,7	3 061,2	5 535,4	7 781,2	7 788,4
Honey, tons	2 685,0	2 115,7	3 171,9	10 157,0	13 357,8	14 066,9
Cocoon, ton	16 479,0	16 211,0	25 151,8	26 293,0	20 941,9	22 769,9

From the data of Table 3 above, it can be seen that the production of agricultural products in our country has had a growing trend over the years.

It expresses the main goals of state regulation of agriculture and state agrarian policy. At the same time, the development of the network depends on the

attention given by the state and the creation of economic and social conditions and legal protection. In order to regulate agriculture by the state, the state conducts agrarian policy for various purposes (Table 4).

Table 4. State regulation of agriculture of the Republic of Uzbekistan and the main goals of state agrarian policy

State regulation of agriculture	State agrarian policy
1. Increasing the competitiveness of agricultural products	1. Ensuring the volume of production of property resources to meet the needs of the population for food products. Ensuring the quality of local food products by producers
2. Ensuring the financial stability of agricultural entities at the expense of income growth and credit resources	2. To preserve and increase the use of natural resources used for the production of agricultural products
3. To ensure rapid development of the priority areas of agriculture	3. Formation of an efficient market of agricultural products, raw materials and food products, ensuring the increase in the profitability of agricultural sector entities and the development of this market infrastructure
4. Updating the basic funds of agricultural sector entities, ensuring technical and technological modernization of the sector	4. Creating a favorable investment environment and increasing the volume of investment in agriculture
5. Regulation of foreign trade and anti-monopoly	5. Stimulation of innovative activities of agricultural producers
6. Ensuring sustainable development of agriculture, increasing the employment and living standards of the rural population	6. Staffing of agriculture
7. Provision of consulting services to agricultural producers, stimulation of innovative activities	7. Ensuring the use of land and property complex of agriculture
8. Information provision in the implementation of the state agrarian policy	8. Formation of the information base on the agrarian sector and its continuous maintenance

At the new stage of the economic development of the Republic of Uzbekistan, the comprehensive statistical study of the structural structure of the economy and the directions of changes in it in all sectors is of great importance, and in the conditions of

modernization and diversification of the economy, it is of urgent importance to develop effective ways of structural changes based on statistical methods.

Dynamic analysis of structural indicators is one of the most important means of studying the laws of

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development of economic processes over time. It is known that various statistical methods are used to quantitatively assess the structure and measure the impact of changes in it on economic indicators: summary statistical indicators, grouping of various forms, multidimensional grouping method, factor analysis methods (including index, correlation-regression analysis method, dispersion analysis), zoning and etc.

Usually, the method of variational indicators is used to quantitatively evaluate the difference between the shares that make up the structure, that is, the speed and intensity of structural changes, or the difference between the color of the shares (position according to the serial number) in a statistically generalized way, correlation-regression analysis and especially the index when evaluating the impact of structural

changes on indicators of economic efficiency method is widely used.

Conclusions and suggestions

The statistical evaluation of the structural changes of two periods in the agricultural economy is carried out on the basis of the following goals: to determine the change of the share of the agricultural sector in one period compared to another period; Quantitative evaluation of the strength and severity of structural shifts. Two groups of indicators are used for statistical evaluation of structural changes that occurred in two or more periods:

1. Indicators based on the difference between the shares representing parts of the same type of the set.

2. Indicators based on the ratio of shares representing one type of parts of the set.

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Article



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ORGANIZATIONAL AND LEGAL ASPECTS OF REGIONAL TOURISM DEVELOPMENT

Abstract: The tourism sector is now an important part of the national economy, it has a practical impact on all aspects of the national economy, and at the same time its socio-economic importance is increasing. The article describes the organizational and legal aspects of the development of regional tourism, explores the legal framework and strategic programs for the development of regional tourism.

Key words: tourism sector, development of the tourism industry, development of regional tourism, socio-economic significance.

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ОРГАНИЗАЦИОННО-ПРАВОВЫЕ АСПЕКТЫ РАЗВИТИЯ РЕГИОНАЛЬНОГО ТУРИЗМА

Аннотация: Туристический сектор в настоящее время является важной частью национальной экономики, он оказывает практическое влияние на все аспекты народного хозяйства, и в то же время его социально-экономическое значение возрастает. В статье описаны организационно-правовые аспекты развития регионального туризма, исследованы правовые основы и стратегические программы развития регионального туризма.

Ключевые слова: туристический сектор, развитии туристической отрасли, развития регионального туризма, социально-экономическое значение.

Введение

Одним из важных факторов обеспечения стабильного социально-экономического развития регионов нашей страны является рациональное использование факторов их конкурентоспособности. В настоящее время мировые ученые и специалисты уделяют большое внимание разработке научно-теоретических основ формирования региональных кластеров как основного механизма повышения конкурентоспособности регионов. Однако следует отметить, что единый взгляд и мнений на этот счет не существует.

Туристическая отрасль в нашей стране вступила в стадию бурного развития. Тем не

менее, существует ряд проблем, связанных с повышением конкурентоспособности регионального туристического рынка и созданием новых возможностей. Одним из наиболее актуальных вопросов является обоснование формирования кластера туристического рынка в регионах, определение его перспективных стратегических направлений и реализация их на практике. Реализация этой инновационной идеи станет мощным импульсом для устойчивого, высокоскоростного роста регионов.

В регионах Узбекистана (в том числе в городах Самарканд, Бухара, Хива, Шахрисабз) сохранилось более 400 архитектурных и историко-культурных памятников,

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археологических памятников, уникальных для каждой эпохи и цивилизации. Большинство из них включены в список ЮНЕСКО, в список всемирного культурного наследия. Это свидетельствует о том, что туристических возможностей в регионах нашей страны достаточно, и их изучение и исследование является одним из главных вопросов современности.

Но надо признать, что если рассматривать нашу страну с точки зрения наличия богатых туристических ресурсов, то приведенные показатели в настоящее время не считаются удовлетворительными.

В докладе Президента Шавката Мирзиёева на расширенном заседании Кабинета Министров об основных результатах социально-экономического развития нашей страны в 2016 году и важнейших приоритетах экономической программы на 2017 год этот вопрос был особо затронут. Например, говоря о развитии туристической отрасли в нашей стране: «В последние годы такая важная сфера, как туризм, осталась вне необходимого уровня внимания руководителя комплекса. Эту ошибку необходимо исправить без всякого сомнения и, главное, эффективно. Мы сейчас утвердили только вопросы, связанные со структурой, занимающейся развитием туризма. Эти меры должны быть подкреплены конкретными мерами по увеличению вклада туризма в развитие экономики Узбекистана, пропаганде наших исторических и культурных ценностей, а также пополнению валютных резервов.

Формирование туристских кластеров в регионах нашей республики подготавливает почву для открытия новых туристических компаний, дальнейшей активизации существующих, подготовки современных туристских продуктов, основанных на полном использовании туристских ресурсов.

Утверждено постановление Президента Республики Узбекистан «О первоочередных мерах по развитию туристической отрасли в 2018-2019 годах» в целях организации мест и активно и всесторонне продвигать национальные туристические продукты на мировом рынке, создание максимально благоприятных условий, экономической, административной и правовой среды для быстрого развития туристической отрасли нашей страны в краткосрочной перспективе, в том числе обеспечение приоритетного участия частного сектора, а также дальнейшее повышение ее конкурентоспособности и качества услуг, предусмотренные, расширяющие экономический

потенциал и доходную базу регионов, новые работы.

Согласно Постановлению Президента Республики Узбекистан «О дополнительных мерах по опережающему развитию туризма в Республике Узбекистан», туризм в стране направлен на диверсификацию национальной экономики, быстрое развитие регионов, создание новых рабочих мест, увеличение Доходы и жизнедеятельность населения. Отмечено, что поэтапно реализуются комплексные меры по развитию как одной из стратегических отраслей, обеспечивающих повышение инвестиционной привлекательности страны, и Президент Республики Узбекистан Олий Мажлису Республики Узбекистан от 28.2018 года в целях реализации предложений, внесенных в Декабрьском Обращении, и в соответствии с задачами, определенными в Стратегии действий по пяти приоритетным направлениям развития Республики Узбекистан на 2017-2021 годы определены:

- реализация международных норм и стандартов, направленных на совершенствование нормативной базы в сфере туризма, создание благоприятных условий для развития туризма;
- развитие туристической инфраструктуры и создание приемлемой и комфортной туристической среды;
- развитие транспортной логистики, расширение внутренних и внешних маршрутов, повышение качества транспортных услуг;
- диверсификация туристических продуктов и услуг, ориентированных на разные сегменты туристического рынка¹;

Туристический сектор в настоящее время является важной частью национальной экономики, он оказывает практическое влияние на все аспекты народного хозяйства, и в то же время его социально-экономическое значение возрастает. Повышение интеллектуального потенциала местного населения и иностранных граждан в сфере туризма с точки зрения истории этих стран (регионов), исторических архитектурных объектов, обычаев и традиций местного населения, а также их отдыха и лечения имеет важное значение. Наступает прямой положительный эффект на экономику страны. Сектор туристических услуг развивается в гармонии с экономикой, обществом и природой.

В законе Республики Узбекистан “О Туризме”² основными направлениями государственной политики в сфере туризма являются:

¹ Указ Президента Республики Узбекистан от 01.05.2019 № УП-5611

² Закон Республики Узбекистан. 18.07.2019. Статья 549, Глава 2, Статья 6.

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- развитие этого сектора как стратегической отрасли экономики страны;
- обеспечение прав граждан на отдых, свободное передвижение и других прав во время путешествия;
- рациональное использование туристских ресурсов и их сохранение;
- совершенствование нормативно-правовой базы³;
- развитие внутреннего туризма, в том числе развитие социального туризма, создание необходимых условий для организации туризма и экскурсий для детей, молодежи, пожилых людей, а также лиц с ограниченными возможностями и малообеспеченных слоев населения;

5 января 2019 года принят Указ Президента Республики Узбекистан №ПФ-5611 «О дополнительных мерах по опережающему развитию туризма в Республике Узбекистан». Согласно этому постановлению утверждена «Концепция развития туризма в Республике Узбекистан на 2019-2025 годы». В нем принимаются практические меры, ориентированные на повышение эффективности проводимых реформ по созданию благоприятных экономических условий и факторов в туристической сфере, постановке приоритетных целей и задач по ускоренному развитию туристической сферы, повышению ее значимости и доли в экономике, диверсификация услуг и повышение их качества, а также улучшение туристической инфраструктуры.

В настоящее время влияние туристической сферы на национальную экономику может быть выражено в следующих функциях:

- создание национальной прибыли;
- создание новых рабочих мест;

- источник, обеспечивающий валютные поступления в государственный бюджет;
- повысить благосостояние населения;
- поддерживать развитие экономической инфраструктуры;
- выравнивание регионального развития;
- привлечение инвестиций, в том числе иностранных;
- поддержка использования медицинских и культурных памятников.

Региональный туризм является уникальной отраслью экономики, и этот сектор, как и другие отрасли, вносит значительный вклад в экономику страны и увеличение ее валового внутреннего продукта. В настоящее время туризм развивается в весьма несбалансированном состоянии.

Организация качественного обслуживания туристов – задача системы крупных туристических компаний и турагентств, расположенных практически во всех городах мира. Комплексный подход к разработке программы приема и обслуживания иностранных и отечественных туристов требует надлежащего планирования.

Исследования показывают, что многие туристические компании в регионах нашей страны не относятся серьезно к туристической деятельности и наблюдается общее отсутствие развития, а также снижение объемов обслуживания туристов в течение года. Кроме того, уровень использования некоторых туристических ресурсов не очень хороший. Чтобы добиться адекватного развития туристических ресурсов, их использования и туристической сферы в целом, мы должны, прежде всего, развивать эту отрасль на региональном уровне.

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³ Указ Президента Республики Узбекистан от 6 апреля 2021 года № ПФ-6199 «О мерах по дальнейшему

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Article



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MEASURES TO CONTROL ALMOND AND BASIC PESTS

Abstract: Almonds belong to the group of nut-like fruits and have been cultivated in our country for a long time. The Latin name of the almond tree (*Amygdalus cammunis* L.) is a tree and shrub belonging to the Anorgulaceae family. About 40 species are known. It is distributed in the north of Asia and Central America, in the south of Europe, in Central Asia. There are 5 types in Uzbekistan. One of them is sweet almond. (*A. comminis* L.) is planted. In addition to oil, protein, sugar, bald almonds contain 2-2.5% amygdalin, which is widely used in the perfume industry and medicine. Almond skin is used in the preparation of gas-absorbing clay, in winemaking, to give the wine its aroma, quality and fullness. Up to 40% of potassium is produced in the ash of almond pods and is used as a fertilizer. Almond wood is very hard and beautiful, so it is a valuable material in carpentry and engineering.

Key words: almonds, pest, crop, damage, wood.

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Introduction

Almonds belong to the group of nut-like fruits and have been cultivated in our country for a long time. The Latin name of the almond tree (*Amygdalus cammunis* L.) is a tree and shrub belonging to the Anorgulaceae family. About 40 species are known. It is distributed in the north of Asia and Central America, in the south of Europe, in Central Asia. There are 5 types in Uzbekistan. One of them is sweet almond. (*A. comminis* L.) is cultivated, the rest occur wild. It is grown in mountainous areas of Uzbekistan up to 1000-1200 m above sea level (Fergana Valley, Surkhandarya, Samarkand, Tashkent regions). The fruit is a hard-shelled pod (nut) covered with a husk (which cracks when ripe). It ripens in July and September. The core contains 35-67% fat, up to 30% protein, as well as sugar, glutinous substances (up to 2.5% amygdalin in bitter almonds). Depending on the variety, the pod is thin (bubble), medium and hard, and the core is sweet or bitter. Economic importance is great, almonds are grown mainly for their sweet pulp.

Today, a lot of attention is being paid to the establishment of almond groves in forestry and agricultural lands. Since almond is a heat-loving,

drought-resistant, xerophytic plant, it has been growing since ancient times on the mountain and sub-mountain slopes of Tashkent, Jizzakh, Samarkand, Kashkadarya, Surkhandarya regions, where annual rainfall exceeds 500-700 mm. In addition to newly planted almond groves, it also grows wild in natural forests. A number of varieties of almonds have been created today, including; Kolkhozchi local variety, Gozal local variety, Samarkand 56 local variety and others are grown in a number of regions of our republic.

Today, almonds are used in many sectors of the economy. It is useful to eat unshelled raw almonds by adding sugar or making jam. Sweet kernel almond has 40-70% fat, 20-25% protein, 6% sugar, is rich in various medicinals, organic substances and is considered a valuable raw material for confectionery industry. It contains up to 10% oil and proteins and carbohydrates. In addition to oil, protein, sugar, bald almonds contain 2-2.5% amygdalin, which is widely used in the perfume industry and medicine. Almond skin is used in the preparation of gas-absorbing clay, in winemaking, to give the wine its aroma, quality and fullness. Up to 40% of potassium is produced in the ash of almond pods and is used as a fertilizer. Almond

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wood is very hard and beautiful, so it is considered a valuable material in carpentry and engineering [1,2,3].

In recent times, there are several pests in almonds, and as a result of their damage, a large part of the crop is lost.

Literature analysis and methodology

The distribution and bioecological features of the almond fruit-eater Mohammed Mansour, Wearing A, Gehring Madsen, Horak and Brown, Van Der Geest and Evenhuis Ciglar, Lacey, Sauphanor, Boivinet, Bouvier, Brun-Barale, Lacey and Unruh, E. Chikman (Turkey), H .Ranji, Y.Karimpoor, A.Dosti (Azerbaijan), Abu Fazel Dosti (Iran), Melmans, Amsym (Belgium), H.Walfgong, C.L.Maria Luisa (Cuba), E.I.Araejo, C.H.Fiesota, A.V.Mishenko (Ukraine) , Tokumoro and Abe Kawahara (Japan) have studied.

In order to obtain a high and quality harvest from almond trees, to develop an integrated control system

with high biological and economic efficiency, determining the species composition, distribution, degree of damage, and bioecological characteristics of various pest insects that damage the plant and its harvest from early spring to ripening and putting it into practice is one of the important tasks of today.

Taking this into account, the following pests can be identified as the main pests of almonds. There are 20 species of almonds, including 3 species belonging to the Hemiptera family, 3 species belonging to the Homoptera family, 6 species belonging to the Coleoptera family, 5 species belonging to the Lepidoptera family. It has been found that species of insects cause damage [4,5].

Research object and methods.

In our research conducted in 2022-2023, more than 10 pests in the almond agobiocenosis were found to cause serious damage to the fruits, leaves and branches of almonds (Table 1).

Table 1. Types of pests encountered in almond agrobiocenosis.

Category	Uzbek name of the pest	The Latin name of the pest
<i>Coleoptera</i> (hard-liners)	Bodom kichik oltin qo'ng'izi	<i>Sphenoptera Kaznakom</i> Jak.
	Olti nuqtali zlatka	<i>Chrysobothris affinis subs nevsikii</i> Richt.
	Xipcha tanali pista zlatkasi	<i>Azputyc viridis</i> L.
	Hidli yog'och o'ymakori	<i>Cossus cossus</i> L.
<i>Lepidoptera</i> (coin winged)	Yong'oq mevaxo'ri	<i>Sarothrypus musculana</i> Ersch. (<i>Erschoviella musculana</i> Ersch.)
	Tengsiz ipakchi	<i>Lymantria dispar</i> L.
	Bodom mevaxo'ri	<i>Eurytoma samsonovi</i> Bass.
<i>Homoptera</i> (isosceles)	Shira (bitlar)	Aphididae (<i>medicaginis</i>) <i>craccivora</i> Koch.

Nut borer - *Erschoviella musculana* Ersch., synonyms *Nycteola musculana* Ersch., *Sarothrypus musculana* Ersch., belongs to the *Lepidoptera* family, *Symatophoridae* family, and is a widespread pest in all regions of Central Asia. [2].

Usually 20-30% of almonds are damaged by this fruit-eater, and in some years up to 60-80%. There are two types of damage to fruits, i.e., in young fruits that have not hardened, the worm eats the center of the kernel, and the fruits fall off. In pitted fruits, the worm feeds only on the side of the fruit, eating the entire flesh and leaving only the outer skin, resulting in completely blackened fruit or dark brown streaks and spots. Worms of the 2nd-3rd generation of the pest hibernate in body crevices.

Eurytoma samsonovi. One of the most dangerous pests of almonds is the almond fruit borer (*Eurytoma samsonovi* Wass). The almond fruit borer

lays its eggs on the fruit. The larvae cause damage to the fruit and cause the fruit to drop. The fruit affected by the larva is different from the others (yellowing) and can be easily separated from them. The larva feeds inside the fruit, moves inside it and eats it completely, leaving the inside empty. Only the shell remains in the fruit. The presence of the pest can be known from the almost 2 mm hole that it makes in the shell. Larvae are white and legless. The almond borer spends the winter inside the almond as a mature larva. Large larvae leave the fruit in the spring. It will arrive after a certain period of time. Control: In winter, the wormy fruits left on the tree and spilled on the ground should be collected and burned. Countermeasures can also be implemented. Traps should be made and chemical treatment should be done when the first large female pest is detected.

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Picture- 1. Damage of fruits by almond fruit borer.



Picture- 2. Fruits infested with almond borer.

Taking into account the life cycle of the pest and the affected fruits, we tested the following chemical agents against the almond fruit borer.

Research results

When the almond blossoms and forms a panicle: Alfa toro 15% sus.c., Espero, sus.k. the first day - by

56.9%. the third day - by 77.2%; on the seventh day, the result was -85.4%: when treated with the drug Espero, sus.c (200+120 g/l), the biological efficiency was -67.7% on the first day; the third day - by 85.9%; and the seventh day was equal to -88.3% (Table 2).

Table 2. Biological effectiveness of chemical treatments against the almond borer
 (Field experience, Toshloq district, 2022-2023 ys).

№	Options	The active substance of the pesticide	Consumption of working fluid in l/ha	The average number of pests on 1 bush of almonds, pcs			Biological efficiency in days.%			
				Before processing	Control days from the day of pesticide application					
					1	3	7	1	3	7
1	ALFA TORO 15% sus.c.	<i>Imidaklopid + abamektin</i>	0,2	33,0	14,2	7,5	4,8	56,9	77,2	85,4

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2	ESPERO, sus.c (200+120 g/l)	<i>Imidakloprid + alfa- sipermetrin</i>	0,2	38,5	12,4	5,4	4,5	67,7	85,9	88,3
3	Control (unprocessed)		-	48,4	52,1	50,7	54,2	-	-	-

Based on the results of the conducted research, Alfa toro 15% sus.k. (0.2 l/ha), Espero, sus.k (200+120 g/l) (0.2 l/ha), if used in the recommended

amount of consumption, up to 85.4-88.3% biological effectiveness is achieved and the damage of these pests is prevented.

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Article



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PROBLEM AND PROSPECTS FOR THE DEVELOPMENT OF SPORTS MANAGEMENT IN UZBEKISTAN

Abstract: This article deals with the problem of sports management of Uzbekistan. First, a brief definition of the concept of sports management is given, followed by an excursion into history. The article discusses the background and origin of sports management the second part of the article is devoted to the current situation and prospects of sports management of Uzbekistan. Special attention is paid to the educational sphere and career opportunities that potential employees may have in the field of sports management. Finally, the article concludes with the perspectives of sports management of Uzbekistan.

Key words: physical culture, sports, sports development, Economics of physical culture, management, Uzbekistan.

Language: Russian

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ПРОБЛЕМА И ПЕРСПЕКТИВЫ РАЗВИТИЯ СПОРТИВНОГО МЕНЕДЖМЕНТА В УЗБЕКИСТАНЕ

Аннотация: В данной статье рассматривается проблема спортивного менеджмента в Узбекистане. Во-первых, дается краткое определение понятию спортивного менеджмента, за которым следует экскурс в историю. В статье рассматриваются предпосылки и происхождение спортивного менеджмента, современному положению и перспективам спортивного менеджмента в Узбекистане. Особое внимание уделяется образовательной сфере и карьерным возможностям, которые могут быть у потенциальных сотрудников в сфере спортивного менеджмента. Наконец, статья завершается перспективами спортивного менеджмента в Узбекистане.

Ключевые слова: физическая культура, спорт, развитие спорта, экономика физической культуры, менеджмент, Узбекистан.

Введение

Президент нашей страны Ш.М.Мирзиёев в своих докладах на совместном заседании Законодательной палаты и Сената Олий Мажлиса Республики Узбекистан отметил: «Важно перейти к современной системе управления для

эффективной организации деятельности сетевых и региональных лидеров. Руководителям министерств и секторов необходимо изменить методы работы и научиться брать на себя ответственность. Главным критерием оценки работы лидеров должно стать продвижение новых

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идей и инициатив по принятию решений, направленных на улучшение жизни населения и решение проблем, негативно влияющих на качество общественного благосостояния", - сказал он. Спортивный менеджмент – это постоянный поиск возможностей комплексного решения прямых и косвенных вопросов в области в меняющейся и непредсказуемой среде. В спорте непредсказуемость результатов делает его еще более привлекательным.

Подчеркнув, что сфера физического воспитания и спорта будет находиться в постоянном внимании руководства страны, серьезные изменения, произошедшие во всех аспектах человеческой деятельности за последние три года, кардинально изменили ситуацию в сфере физического воспитания и спорта. требует применения передовых методов и моделей спортивного менеджмента. Для этого необходимо отправить спортивных менеджеров в страны-лидеры в области спорта минимум на 6 месяцев для повышения их квалификации.

В нашей стране спортивная индустрия, сформированная совместно с современными предприятиями и организациями, соответствующими мировым стандартам, играет важную роль в развитии социальной сферы и физического воспитания и спорта, которые являются ее неотъемлемой частью. Говоря об экономической эффективности организаций, оказывающих физкультурно-спортивные услуги, уместно оценить их значение в повышении уровня жизни населения и охраны здоровья.

В связи с этим, рассматривая результаты спортивной деятельности в Узбекистане, наблюдается следующая тенденция, а именно низкий уровень освещения нашей страны и мировых спортивных арен из-за отсутствия координации деятельности по физическому воспитанию и развитию спорта, отсутствие спортивно-экономических моделей в профессиональном спорте, развитие менеджмента и маркетинга [1. с 45]. Мы можем наблюдать, что концепция спортивного менеджмента не получила полного развития в управлении спортивными организациями в рамках обеспечения их адаптации к внешней среде. Согласно анализу, такая ситуация на рынке спортивной сферы Узбекистана вызвана, прежде всего, неполным формированием эффективной конкурентной среды, неспособностью создать необходимую основу для целенаправленной стратегии управления в совместном собственности, а также неразвитость экономической основы развития системы координации и регулирования деятельности спортивной сферы [2. с 126]. Спортивный менеджмент помогает принимать управленческие решения в организациях, укреплять бренд на рынке, искать источники

независимого дохода, повышать эффективность рекламной деятельности, реализовывать особый подход к клиентам, производить конкурентоспособную спортивную продукцию, выпускать их не только на внутренний потребительский рынок, но и на внешние рынки.

Сегодня в экономически развитых странах физическое воспитание и спорт являются не только средством укрепления здоровья нации и представления страны всему миру, но и превратились в значимую прибыльную отрасль экономики, а также спортивную индустрию.

Современная спортивная индустрия представляет собой «живой» и многогранный организм, создающий широкие возможности для реализации различных планов, в том числе предпринимательской деятельности. Существующая серьезная конкуренция за время и средства клиентов требует от спортивных менеджеров развитого маркетингового мышления, позволяющего объективно оценивать сложную многофакторную рыночную и социальную среду, ставить стратегические цели, выбирать стратегии и разрабатывать эффективные средства их реализации.

В настоящее время экономические процессы и общественные отношения переживают очень быстрое и глобальное информационное «начало». В результате прежние представления о маркетинге кардинально меняются, его возможности расширяются – появляются новые возможности и продукты, каналы коммуникаций и реализации продукции. Несмотря на то, что большая часть процессов управления выполняется на компьютерах, разработка идеологии бизнеса, выбор направлений, целей и стратегии по-прежнему остаются в «руках» человека [6].

В этих целях обеспечить финансовую независимость спортивных организаций, связанных с развитием массового спорта в регионах нашей страны, создать инновационную модель, направленную на создание соответствующих условий, определить корпоративные целевые маркетинговые стратегии на основе методологии оценки развития физической культуры и спорта, а также определить инновационную методику определения спроса на высокоталантливых спортсменов. Для разработки и создания экономической модели удовлетворения спроса на спорт, обеспечения конкурентоспособности на мировом рынке необходимо научно обосновать целевую стратегическую концепцию спортивного маркетинга для развития физического воспитания и спорта, а также для разработки инновационных методов.

Приведенная информация показывает, что роль спортивного менеджмента и его совершенствование имеет большое значение для

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выхода спорта на индустриальный уровень в нашей стране. Созданная ниже «система реализации модели развития спортивного менеджмента в сфере физического воспитания и спорта в Узбекистане» станет основой для комплексного решения существующих проблем [4. с 78].

Масштабные социально-экономические реформы, реализуемые в нашей стране, создают возможности для развития физической культуры и спорта. Но есть системные проблемы в сфере физического воспитания и спорта, а именно низкий уровень заинтересованности болельщиков в развитии спорта в нашей стране, отсутствие игроков высокого уровня в сборных командах, отсутствие экономической модели и понимания в развитии профессионального спорта, отсутствие доходов от договора на право телевидения (ТВ) трансляций соревнований, национальной интегрированной информационной системы образования и спорта, включая регистрацию и учет деятельности спортсменов - «СКМ-спортсмен», «СКМ-тренер» для предоставления базы данных тренеров, и паспортирования физкультурно-воспитательных, оздоровительных и спортивных объектов республики - «Skmsportinshoot» требует организации систем мониторинга спортивных результатов и оценки достижений через информационные системы.

Физическое воспитание и спорт представляют собой специфическую сферу деятельности человека. Поэтому необходимо изучение «Человеческого капитала» при научном обосновании технологии разработки стратегии спортивного менеджмента. Эта экономическая категория характерна и для других сфер человеческой деятельности. А вот в сфере физического воспитания и спорта важен именно этот показатель, а именно уровень подготовки тренеров и спортсменов, физическая подготовка спортсменов, психические, социальные и другие показатели, опыт их участия в крупных соревнованиях и т.д.

Создание инновационной модели, направленной на обеспечение финансовой независимости спортивных организаций, связанной с развитием массового спорта в регионах республики и создание соответствующих условий, определение корпоративных целевых стратегий управления спортом на основе методологии оценки развития физической культуры и спорта, разработка инновационной методики определения спроса на высокоталантливых спортсменов.

Функциональными задачами спортивных менеджеров являются создание экономической модели удовлетворения спроса на выездные и спортивные услуги и разработка стратегической концепции спортивного менеджмента для развития физической культуры и спорта на научной основе в целях обеспечения конкурентоспособности на мировых рынках.

Также для анализа рынка спортивных товаров будет разработана «Модель функционального анализа рынка». Это помогает сформировать свою позицию с учетом особенностей спортивного маркетинга конкретного предприятия. Согласно ему рыночные функции спортивных предприятий разделены на четыре группы: поставщик, производитель, дистрибьютор и розничный торговец.

В то же время данная модель оказывает практическую поддержку тем, кто стремится к изменениям и развитию в сфере спорта в создании «успешных» спортивных продуктов (услуг), удовлетворяющих потребности клиентов, основанные на чувствах и желаниях, совершенстве, общении и социальной позиции. Модель принятия решений по созданию системы спортивного менеджмента и налаживанию отношений сотрудничества в спортивных организациях и предприятиях позволяет легко решить определенную ситуацию. В этом контексте следует отметить, что важнейшие аспекты современного спортивного менеджмента и некоторые вопросы деятельности спортивных организаций и предприятий в рамках системы рыночных отношений (например, работа с болельщиками, лицензирование, маркетинг спортивных объектов) также выражены.

Важнейшим фундаментальным вопросом в менеджменте является принятие оптимальных решений, заключающееся в синтезе различных компонентов спортивного менеджмента. Среди множества различных решений важно выделить управленческие решения, особенно те, которые выступают в виде программы деятельности физкультурно-спортивной организации. В сфере спорта управленческие решения используются как процедуры поиска и анализа необходимой информации и постановки, согласования, утверждения и реализации целей и задач. Управленческие решения отражаются в законах, постановлениях, приказах, планах и других документах как продукт управленческой деятельности.

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MEANINGFUL CALCULATIONS OF UNCORRELATED VARIABILITY FACTORS OF A NEW GRAIN CULTURE VARIETY

Abstract: The z-variabilities of 20 measurements of each of 6 correlated indicators of a grain crop of a supposedly new variety were calculated. The matrix of z-variability values $Z_{m6}=\{z_{ij}\}$, $z_i=(z_{1j}, z_{2j}, \dots, z_{mj})^T$, $j=1, \dots, 6$, is transformed into the matrix $Y_{m6}=Z_{m6}C_{66}=\{y_i\}$, $y_j=(y_{1j}, \dots, y_{mj})^T$, uncorrelated y-variability values. 2 matrices (C_{66}, A_{66}) were calculated using the correlation matrix R_{66} , where $R_{66}=(1/m)Z_{m6}^T Z_{m6}$, $Y_{mn}=Z_{m6}C_{66}$, $A_{66}=(1/m)Y_{m6}^T Y_{m6}$, $R_{66}C_{66}=C_{66}A_{66}$, $C_{66}St_{66}=I_{66}$, $St_{66}C_{66}=I_{66}$, $A_{66}=\text{diag}(2.2728, 1.9596, 0.9124, 0.4525, 0.3894, 0.0132)$, $\text{tr}(A_{66})=\lambda_1+\dots+\lambda_6=6$. The initial semantic equality is a semantic matrix equality of the form: meaning (Y_{m6}) = meaning ($Z_{m6}C_{66}$). A system of 6 semantic equations with 6 unknown y-senses has been developed. The model cognitively models semantic variables and numerically models quantitative relationships between the manifestations of the properties of a grain crop variety.

Key words: semantic variables, matrix semantic equality, mimnogosemantic equation with known and unknown semantic variables, cognitive model of a new variety of grain crop. 6 semantic solutions were found: meaning(y_1), meaning(y_2), meaning(y_3), ..., meaning(y_6), significantly complementing the initial knowledge. We found 6 semantic solutions to the semantic multidimensional equation $\text{meaning}(y_1) \oplus \dots \oplus \text{meaning}(y_6) = \text{meaning}(Z_{m6}C_1) \oplus \dots \oplus \text{meaning}(Z_{m6}C_6)$, where $c_j=(c_{1j}, c_{2j}, \dots, c_{6j})^T$ is the j-th eigenvector from jth column of the C_{66} matrix. Implemented in the form of a computer program, formulaic and phraseological types of model elements are given, and visualized on graphs describing the mutual relationships of the manifestations of the properties of a grain crop variety. The semantic and formulaic justification of knowledge from 6 semantic equations is given. The semantic and formulaic justification of knowledge from 6 semantic equations is given. The sequence of extracted knowledge (Table 4) reflects the noticeably strong randomness (of the actual types of work of the breeder) of the fact of manifestations of factors $\{z_1, z_5, z_6\}$ that made it possible to achieve the desired effect - a noticeably high yield of a new variety of grain crop. The model shows a noticeably strong randomness of the fact of manifestation of factor $\{z_1, z_5, z_6\}$, and the breeder "got lucky" as a result of his correctly planned types of work.

Key words: semantic variables, matrix semantic equality, mimnogosemantic equation with known and unknown semantic variables, cognitive model of a new variety of grain crop.

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СМЫСЛОВЫЕ ВЫЧИСЛЕНИЯ ИЗМЕНЧИВОСТЕЙ НЕКОРРЕЛИРОВАННЫХ ФАКТОРОВ НОВОГО СОРТА ЗЕРНОВОЙ КУЛЬТУРЫ

Аннотация: Вычислены z-изменчивости 20 измерений каждого из 6 коррелированных показателей зерновой культуры предположительно нового сорта. Матрица значений z-изменчивости $Z_{m6}=\{z_i\}$, z_i

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$= (z_{1j}, z_{2j}, \dots, z_{mj})^T$, $j=1, \dots, 6$, преобразована в матрицу $Y_{m6} = Z_{m6}C_{66} = \{y_i\}$, $y_j = (y_{1j}, \dots, y_{mj})^T$, некоррелированных значений y -изменчивости. Вычислены 2 матрицы (C_{66}, A_{66}) по корреляционной матрице R_{66} , где $R_{66} = (1/m)Z_{m6}^T Z_{m6}$, $Y_{mn} = Z_{m6}C_{66}$, $A_{66} = (1/m)Y_{m6}^T Y_{m6}$, $R_{66}C_{66} = C_{66}A_{66}$, $C_{66}C_{m66} = I_{66}$, $C_{m66}C_{66} = I_{66}$, $A_{66} = \text{diag}(2.2728, 1.9596, 0.9124, 0.4525, 0.3894, 0.0132)$, $\text{tr}(A_{66}) = \lambda_1 + \dots + \lambda_6 = 6$. Исходным смысловым равенством служит смысловое матричное. Это равенство вида: $\text{смысл}(Y_{m6}) = \text{смысл}(Z_{m6}C_{66})$. Разработана система из 6 смысловых уравнений с 6 неизвестными y -смыслами. В модели когнитивно моделируются смысловые переменные, численно моделируются количественные связи проявлений свойств сорта зерновой культуры. Найдены 6 семантических решений: $\text{смысл}(y_1)$, $\text{смысл}(y_2)$, $\text{смысл}(y_3)$, ..., $\text{смысл}(y_6)$, существенно дополняющие исходные знания. Найдены 6 семантических решений смыслового многомерного уравнения $\text{смысл}(y_1) \oplus \dots \oplus \text{смысл}(y_6) = \text{смысл}(Z_{m6}c_1) \oplus \dots \oplus \text{смысл}(Z_{m6}c_6)$, где $c_j = (c_{1j}, c_{2j}, \dots, c_{6j})^T$ - j -ый собственный вектор из j -ого столбца матрицы C_{66} . Реализованы в виде компьютерной программы, даны формульное, фразеологическое виды элементов модели, визуализировано на графиках описания взаимных связей проявлений свойств сорта зерновой культуры. Приведены смысловое и формульное обоснования знаний из 6 смысловых уравнений. Последовательность извлеченных знаний (Таблица 4) отражает заметно сильную случайность (фактических видов работ селекционера) факта проявлений факторов $\{z_1, z_5, z_6\}$ позволивших достигнуть желаемого эффекта – заметно высокой урожайности нового сорта зерновой культуры. В модели видна заметно сильная случайность факта проявлений факторов $\{z_1, z_5, z_6\}$, а селекционер «поймал удачу» в результате своих правильно спланированных видов работ.

Ключевые слова: смысловые переменные, матричное смысловое равенство, многосмысловое уравнение с известными и неизвестными семантическими переменными, когнитивная модель зерновой культуры нового сорта.

Введение

Селекционеры анализируют тенденции генотипических сдвигов признаков продуктивности и морфобиологических особенностей сортов зерновой культуры. Определяют основные принципы и направления отбора высокоурожайных генотипов и структурно-биологические параметры рабочей модели засухоустойчивого сорта. Ищут возможности формирования густой продуктивной стеблестойкости к моменту уборки. Делают акцент при отборе на заметное число и озерненность колосков, которые определяют ведущий признак продуктивности колоса – озерненность сорта. Продуктивность колоса - основной структурный компонент высокоурожайных сортов. В соответствии с этими требованиями и на основе целенаправленного отбора исходных форм с последующим формированием общих требований к сортам степного экотипа - высокая засухоустойчивость в период всходы-колотение, устойчивость к поражению корневыми гнилями, выживаемость растений и их способность к продуктивному сушению в относительно благоприятных условиях. Селекционер из Института цитологии и генетики СО АН СССР на ладони руки раскладывал колосок, крошил зерна (на моей ладони-подставке), показывал нам свои зернышки, головную часть некоторых из них, толщину, число зерен в колоске. Вышеприведенные в статье слова он рассказывал, объяснял нам (нас было трое – из Вычислительного центра СО АН СССР) доходчиво, дал нам таблицу данных. Мы прониклись уважением к его работе.

Теперь я воспринимаю числа из его таблицы

данных как результат случайных воздействий (нет ничего более закономерного... чем случайное) очень большого количества разных факторов. Все требования к таким опытам в естественной среде селекционером выполнены и результат – таблица данных. Не имея никакого объекта, кроме таблицы данных, разработаем познающую (когнитивную) модель, использующую смыслы и значения 6 признаков сорта зерновой культуры (Таблица 1).

Исходные данные

Исходные данные о 6 свойствах сорта зерновой культуры (Таблица 1) из 20 делянок Алтайского края (ныне СФО РФ). В модель введены коррелированные 6 z -переменные. 1. Имена-смыслы z -переменных [1]:

- 1) Длина стебля (z_1);
- 2) Длина колоса (z_2);
- 3) Число колосков в стебле (z_3);
- 4) Вес одного зернышка в граммах (z_4);
- 5) Число зерен в колоске (z_5);
- 6) Вес 1000 зерен (в условных единицах) (z_6).

Когнитивная модель

Для когнитивной модели входными переменными являются:

1.а) Числовые данные о 6 свойствах сорта зерновой культуры (Таблица 1);

1.б) Имена-смыслы z -переменных: длина стебля (z_1); длина колоса (z_2); число колосков в стебле (z_3); вес одного зернышка в граммах (z_4); число зерен в колоске (z_5); вес 1000 зерен (в условных единицах) (z_6).

2. Введены в модель числовые значения некоррелированных y -переменных ($\text{covar}(y_1, y_2) = \text{covar}(y_2, y_3) = \dots = \text{covar}(y_1, y_5) = \text{covar}(y_1, y_6) = 0$) и

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смысловые переменные (у-переменные):
смысл(y_1), смысл(y_2), ..., смысл(y_6).

3. Вычислены 2 матрицы (C_{66}, Λ_{66}) они вычисляются с высокой точностью по корреляционной матрице R_{66} , где матрица R_{66} вычисляется по реальным данным. Ее матрица собственных чисел Λ_{66} и матрица собственных векторов C_{66} удовлетворяют условиям: $R_{66} = (1/m)Z_{m6}^T Z_{m6}$, $Y_{mn} = Z_{m6} C_{66}$, $\Lambda_{66} = (1/m)Y_{m6}^T Y_{m6}$, $R_{66} C_{66} = C_{66} \Lambda_{66}$, $C_{66} C_{66}^T = I_{66}$, $C_{66}^T C_{66} = I_{66}$, $\Lambda_{66} = \text{diag}(2.2728, 1.9596, 0.9124, 0.4525, 0.3894, 0.0132)$, $\text{tr}(\Lambda_{66}) = \lambda_1 + \dots + \lambda_6 = 6$.

4. Вычисленные 2 матрицы $Y_{mn} = Z_{m6} C_{66}$ образуют систему числовых алгебраических уравнений с известными числовыми переменными (y_1, \dots, y_6), (z_1, z_2, \dots, z_6):

$$y_1 = z_1(-0.5101) + z_2(-0.2618) + z_3 \cdot 0.1066 + z_4 \cdot 0.3356 + z_5(-0.7395) + z_6 \cdot 0.0193;$$

$$y_2 = z_1 \cdot 0.2655 + z_2(-0.0520) + z_3 \cdot 0.9503 + z_4 \cdot 0.1491 + z_5 \cdot 0.0399 + z_6(-0.0025);$$

$$y_3 = z_1 \cdot 0.3820 + z_2(-0.5719) + z_3 + z_1(-0.1372) + z_4 \cdot 0.0088 + z_5(-0.0953) + z_6(-0.7064);$$

$$y_4 = z_1 \cdot 0.3918 + z_2(-0.5645) + z_3(-0.1239) + z_4(-0.0665) + z_5(-0.1000) + z_6 \cdot 0.7057;$$

$$y_5 = z_1(-0.4447) + z_2(-0.3311) + z_3 \cdot 0.2266 + z_4(-0.7942) + z_5 \cdot 0.0951 + z_6(-0.0392);$$

$$y_6 = z_1 \cdot 0.4149 + z_2 \cdot 0.4164 + z_3 \cdot 0.0093 + z_4(-0.4795) + z_5(-0.6507) + z_6(-0.0328);$$

5. Смысловое матричное равенство вида: $\text{смысл}(Y_{m6}) = \text{смысл}(Z_{m6} C_{66})$ служит исходным условием. Ищется семантическое решение смыслового многомерного уравнения $\text{смысл}(y_1) \oplus \dots \oplus \text{смысл}(y_6) = \text{смысл}(Z_{m6} c_1) \oplus \text{смысл}(Z_{m6} c_6)$, где $c_j^T = (c_{1j}, c_{2j}, c_{3j}, c_{6j})$, $y_j^T = (y_{1j}, \dots, y_{mj})$, $Z_{m6} = \{z_i\}$, $z_j^T = (z_{1j}, z_{2j}, z_{3j}, z_{mj})$, $j = 1, \dots, 6$.

6. Когнитивно конструируются 6 семантических решений: $\text{смысл}(y_1)$, $\text{смысл}(y_2)$, $\text{смысл}(y_3)$, $\text{смысл}(y_6)$, существенно дополняющие исходные смыслы и решается система из 6 смысловых уравнений:

$$\text{смысл}(y_1) = (z_1) \cdot (-0.5101) \oplus \text{смысл}(z_2) \cdot (-0.2618) \oplus \text{смысл}(z_3) \cdot 0.1066 \oplus \text{смысл}(z_4) \cdot 0.3356 \oplus \text{смысл}(z_5) \cdot (-0.7395) \oplus \text{смысл}(z_6) \cdot 0.0193;$$

$$\text{смысл}(y_2) = (z_1) \cdot 0.2655 \oplus \text{смысл}(z_2) \cdot (-0.0520) \oplus \text{смысл}(z_3) \cdot 0.9503 \oplus \text{смысл}(z_4) \cdot 0.1491 \oplus \text{смысл}(z_5) \cdot 0.0399 \oplus \text{смысл}(z_6) \cdot (-0.0025);$$

$$\text{смысл}(y_3) = (z_1) \cdot 0.3820 \oplus \text{смысл}(z_2) \cdot (-0.5719) \oplus \text{смысл}(z_3) \cdot (-0.1372) \oplus \text{смысл}(z_4) \cdot 0.0088 + \text{смысл}(z_5) \cdot (-0.0953) \oplus \text{смысл}(z_6) \cdot (-0.7064);$$

$$\text{смысл}(y_4) = (z_1) \cdot 0.3918 \oplus \text{смысл}(z_2) \cdot (-0.5645) \oplus \text{смысл}(z_3) \cdot (-0.1239) \oplus \text{смысл}(z_4) \cdot (-0.0665) \oplus \text{смысл}(z_5) \cdot (-0.1000) \oplus \text{смысл}(z_6) \cdot 0.7057;$$

$$\text{смысл}(y_5) = (z_1) \cdot (-0.4447) \oplus \text{смысл}(z_2) \cdot (-0.3311) \oplus \text{смысл}(z_3) \cdot 0.2266 \oplus \text{смысл}(z_4) \cdot (-0.7942) \oplus$$

$$\text{смысл}(z_5) \cdot 0.0951 \oplus \text{смысл}(z_6) \cdot (-0.0392);$$
$$\text{смысл}(y_6) = (z_1) \cdot 0.4149 \oplus \text{смысл}(z_2) \cdot 0.4164 \oplus \text{смысл}(z_3) \cdot 0.0093 \oplus \text{смысл}(z_4) \cdot (-0.4795) \oplus \text{смысл}(z_5) \cdot (-0.6507) \oplus \text{смысл}(z_6) \cdot (-0.0328).$$

7. Семантические решения системы из 6 смысловых уравнений:

а) $\text{смысл}(y_6) =$ «при слабо выраженной длине стебля выполняется закономерность: чем меньше число колосков на стебле тем больше вес зернышка»;

б) $\text{смысл}(y_5) =$ «чем короче длина стебля, тем меньше вес 1000 зерен»;

в) $\text{смысл}(y_4) =$ «при заметном росте длины стебля: меньшему числу зерен в колоске соответствует меньший вес 1000 зерен»;

г) $\text{смысл}(y_3) =$ «колос очень большой длины имеет заметное число зерен в колоске»;

д) $\text{смысл}(y_2) =$ «урожайность культуры, исчисляется из средневзвешенного веса, определенного по значениям z -переменных z_4, z_5, z_6 »;

е) $\text{смысл}(y_1) =$ «прирост веса одного зернышка является следствием прироста веса 1000 зерен, уменьшения длины стебля, уменьшения числа зерен в колоске».

8. Вычисленные по реальным данным числовые матрицы: матрица Z_{m6} z -отклонений, матрица X_{m6} x -отклонений от средних (дополнительно к стандартизированной матрице Z_{m6} , для добычи дополнительных знаний о взаимных динамиках x -отклонений свойств зерновой культуры), матрицы y -отклонений от 0 - $Y_{m6} = Z_{m6} C_{66}$, $Y_{m6} = X_{m6} C_{66}$, $X_{m6} = Z_{m6} S_{66}$.

9. Визуализация кривых взаимных динамик z -, x -, y -отклонений факторов, вычисленных в познающей модели о свойствах нового сорта зерновой культуры.

В модели решена задача: разработать систему из 6 смысловых уравнений с $12=6+6$ семантическими переменными $\text{смысл}(y_1)$, $\text{смысл}(y_2)$, $\text{смысл}(y_3)$, $\text{смысл}(y_6)$, $\text{смысл}(z_1)$, ..., $\text{смысл}(z_6)$, удовлетворяющих матричному смысловому равенству вида $\text{смысл}(Y_{m6}) = \text{смысл}(Z_{m6} C_{66})$, где $\text{смысл}(Z_{m6}) = \text{смысл}(y_1) \oplus \dots \oplus \text{смысл}(y_6)$, $\text{смысл}(Z_{m6} C_{66}) = \text{смысл}(Z_{m6} c_1) \oplus \dots \oplus \text{смысл}(Z_{m6} c_6)$. j -ый столбец c_j матрицы C_{66} (j -ый собственный вектор) имеет вид: $c_j = (c_{1j}, c_{2j}, \dots, c_{6j})^T$, $i = 1, \dots, 6$. Матричному смысловому равенству соответствует математическое матричное равенство для числовых переменных вида: $Y_{m6} = Z_{m6} C_{66}$.

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Таблица 1. Данные о 6 свойствах сорта зерновой культуры

№	x_1^0	x_2^0	x_3^0	x_4^0	x_5^0	x_6^0
1	30	1.81	3.61	0.28	1.03	335.00
2	10	1.93	0.29	0.01	0.00	365.00
3	30	2.79	0.24	0.02	4.29	315.00
4	15	1.81	0.40	0.04	2.38	325.00
5	15	1.87	1.65	0.19	6.54	283.00
6	40	2.17	0.59	0.15	0.15	300.00
7	15	2.34	6.40	0.71	1.91	327.00
8	10	1.85	9.74	1.83	2.24	290.00
9	10	2.09	19.25	1.70	1.81	317.00
10	55	2.03	8.73	0.53	3.09	273.00
11	5	2.37	0.81	0.09	0.00	356.00
12	5	2.33	82.00	20.72	2.25	314.00
13	35	1.93	2.05	0.08	2.10	345.00
14	25	2.53	2.54	0.19	2.57	315.00
15	80	2.14	22.00	3.86	2.36	305.00
16	90	1.93	4.53	0.45	1.55	285.00
17	15	2.16	0.22	0.02	0.00	350.00
18	10	1.90	2.99	0.36	0.47	320.00
19	100	1.93	1.17	0.21	21.09	270.00
20	25	1.81	0.17	0.03	0.00	305.00

Таблица 2. Вычисленная матрица C_{66} собственных векторов при $\Lambda_{66} = \text{diag}(2.2728, 1.9596, 0.9124, 0.4525, 0.3894, 0.0132)$

	c_1	c_2	c_3	c_4	c_5	c_6	
1	-0.5101	-0.2618	0.1066	0.3356	-0.7395	0.0193	1.0000
2	0.2655	-0.0520	0.9503	0.1491	0.0399	-0.0025	1.0001
3	0.3820	-0.5719	-0.1372	0.0088	-0.0953	-0.7064	1.0000
4	0.3918	-0.5645	-0.1239	-0.0665	-0.1000	0.7057	1.0000
5	-0.4447	-0.3311	0.2266	-0.7942	0.0951	-0.0392	1.0001
6	0.4149	0.4164	0.0093	-0.4795	-0.6507	-0.0328	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	

Таблица 3. Вычисленная матрица R_{66}

ROW 1	1.0000	-0.1775	-0.1343	-0.1579	0.5594	-0.5791
ROW 2	-0.1775	1.0000	0.1689	0.1805	-0.0902	0.1735
ROW 3	-0.1343	0.1689	1.0000	0.9853	-0.0498	-0.0851
ROW 4	-0.1579	0.1805	0.9853	1.0000	-0.0357	-0.0528
ROW 5	0.5594	-0.0902	-0.0498	-0.0357	1.0000	-0.5393
ROW 6	-0.5791	0.1735	-0.0851	-0.0528	-0.5393	1.0000

Конструирование смыслов 6 у-факторов зерновой культуры

Начнем когнитивный анализ с у-переменной y_6 с наименьшей дисперсией, близкой к нулю [2]. Этот фактор является стабильно выраженным

фактором, постоянно присущим 20 делянкам, данные которых мы подвергаем анализу. Переменные u_1, \dots, u_6 получают новые смыслы в соответствии с известными смыслами подмножеств из 6 z-переменных. Из имеющих

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OAJI (USA) = 0.350

прежние смыслы, из полученных ниже новых смыслов, из визуализации взаимных динамик переменных мы получим новые знания о 20 делянках селекционной работы.

Числовая переменная y_6 имеет смысловое уравнение с одним неизвестным $\text{смысл}(y_6)$ в левой части смыслового равенства: $\text{смысл}(y_6) = \text{смысл}(z_1) * (0,0193) \oplus \text{смысл}(z_2) * (-0,0025) \oplus \text{смысл}(z_3) * (-0,7064) \oplus \text{смысл}(z_4) * 0,7057 \oplus \text{смысл}(z_5) * (-0,0392) \oplus \text{смысл}(z_6) * (-0,0328)$. Чем меньше число колосков на стебле (с силой $c^2_{36} = (-0,7064)^2$), тем больше вес зернышка (с силой $c^2_{46} = 0,7057^2$), при этом длина стебля выражена слабо (с силой $c^2_{16} = (0,0193)^2$). Мы предполагаем: селекционер упорядочил номера признаков в таблице данных (Таблица 1) таким образом, что у нас: $(j-1)$ -ая z -переменная является причиной для ее следствия - (j) -ой z -переменной. Причинно-следственная связь имеет вид: $z_1 \rightarrow z_2 \rightarrow z_3 \rightarrow z_4 \rightarrow z_5 \rightarrow z_6$. Фактор «длина стебля» (z_1) является причиной для следствия – фактора «длина колоса» (z_2), проявляемых с силами c^2_1, c^2_2 . Это происходит в результате реальных действий селекционера – обертывания колоса марлей, имитации тепличных условий, создание в нужные моменты времени условий для стеблей или колосков защиты от лишних мешающих влияний. Не будет стебля, не будет и колоска. При нулевом числе колосков в стебле (z_3) вес одного зернышка равен 0 граммов (z_4): работает причинно-следственная связь ($z_3 \rightarrow z_4$). При конструировании фраз смыслов y -переменных будем придерживаться этого правила, поэтому: $\text{смысл}(y_6) =$ «при слабо выраженной (с силой $c^2_{16} = (0,0193)^2$), длине стебля выполняются закономерность: чем меньше число колосков на стебле (с силой $c^2_{36} = (-0,064)^2$), тем больше вес зернышка (с силой $c^2_{46} = 0,7057^2$)». Здесь применяется причинно-следственная связь ($z_3 \rightarrow z_4$). Этот $\text{смысл}(y_6)$ отражает постоянство количественного проявлений фактора y_6 ($\text{disp}(y_6) = \lambda_6 = 0,0132$). Для наших 20 делянок верна вышеприведенная фраза смысла: $\text{смысл}(y_6) =$ «при слабо выраженной длине стебля выполняются закономерность: чем меньше число колосков на стебле тем больше вес зернышка». Это можно написать в виде символов, отражающих действия постоянных мелких фактов, наблюдаемых селекционером: $z_3 \downarrow, z_4 \uparrow$.

Смысл $\text{смысл}(y_5)$ «чем короче длина стебля и меньше число колосков в стебле, тем меньше вес 1000 зерен». Это смысловое решение обосновано на силах проявлений изменчивостей z -переменных z_1, z_3, z_6 в 3-х смыслах-слагаемых из уравнения $\text{смысл}(y_5) = \text{смысл}(z_1) * (-0,7395) \oplus \text{смысл}(z_3) * (-0,1000) \oplus \text{смысл}(z_6) * (-0,6507)$. Чем короче (знак минус при $(-0,7395)$) длина стебля (с силой $c^2_{15} = (-0,7395)^2$) и меньше (знак минус) при

$(-0,1000)$ число колосков в стебле (проявленное с силой $c^2_{15} = (-0,1000)^2$), тем меньше вес 1000 зерен (проявленный с силой $c^2_{65} = (-0,6507)^2$). Этот $\text{смысл}(y_5)$ отражает постоянство количественного проявления фактора y_5 ($\text{disp}(y_5) = \lambda_5 = 0,3894 > 0,0132 = \text{disp}(y_6) = \lambda_6$). Для наших 20 делянок вышеприведенная фраза смысла $\text{смысл}(y_5)$. Чем короче длина стебля, тем меньше вес 1000 зерен (озерненность колоса мала). Эти простые извлеченные из числовых данных знания повышают интерес и доверие к последующим добытым знаниям из более сложных смысловых уравнений (с более сильными неслучайными случайностями). Формульное выражение постоянных мелких фактов, наблюдаемых селекционером (далекие от желаемых) имеет вид: $z_1 \downarrow, z_6 \downarrow$.

Рассмотрим смысловое уравнение $\text{смысл}(y_4) = \text{смысл}(z_1) * (0,3356) \oplus \text{смысл}(z_2) * 0,1491 \oplus \text{смысл}(z_3) * (0,0088) \oplus \text{смысл}(z_4) * (-0,0663) \oplus \text{смысл}(z_5) * (-0,7942) \oplus \text{смысл}(z_6) * (-0,4795)$. Выделим слагаемые с заметными «весами»: $\text{смысл}(y_4) = \text{смысл}(z_1) * (0,3356) \oplus \text{смысл}(z_2) * 0,1491 \oplus \text{смысл}(z_5) * (-0,7942) \oplus \text{смысл}(z_6) * (-0,4795)$. При заметной длине стебля (с силой $c^2_{14} = 0,3356^2$) имеем закономерность: чем меньше (знак минус при $c^2_{54} = (-0,7942)^2$) число зерен в колоске ($c^2_{54} = (-0,7942)^2$), тем меньше (знак минус при $c^2_{64} = (-0,4795)^2$) вес 1000 зерен (проявленный с силой $c^2_{64} = (-0,4795)^2$). Этот $\text{смысл}(y_4)$ отражает постоянную закономерность: «при заметном росте длины стебля: меньшему числу зерен в колоске соответствует меньший вес 1000 зерен». При этом «число зерен в колоске» имеет больший «вес» $(-0,7942)^2 > (-0,4795)^2$. Это ключ к цели селекционной работы в 20 делянках. Изменчивость проявления фактора y_4 мала ($\text{disp}(y_4) = 0,4525 > \lambda_5 = 0,3894 > 0,0132 = \text{disp}(y_6) = \lambda_6$). Это дает следующее формульное выражение постоянно наблюдаемой мелкой закономерности, наблюдаемой селекционером: постоянное проявление причины и следствий: $\{z_1 \uparrow\} \Rightarrow \{z_5 \downarrow, z_6 \downarrow\}$.

Рассмотрим смысловое уравнение $\text{смысл}(y_3) = \text{смысл}(z_1) * (0,1066) \oplus \text{смысл}(z_2) * 0,950 \oplus \text{смысл}(z_3) * (-0,1372) \oplus \text{смысл}(z_4) * (-0,1239) \oplus \text{смысл}(z_5) * (0,2266) \oplus \text{смысл}(z_6) * (0,0093)$. Здесь присутствуют 5 z -переменных. Они добавляют информации к смыслам ранее выявленных знаний из y -переменных y_6, y_5, y_4 . Резко выделяются «веса», относящиеся к y -переменной y_3 . Выделим смысловое уравнение $\text{смысл}(y_3) = \text{смысл}(z_2) * 0,9503 \oplus \text{смысл}(z_5) * (0,2266)$. Смысл(y_3) = «колос очень большой длины (проявленный с силой $c^2_{13} = 0,9503^2$, $\text{смысл}(z_1)$) имеет заметное число зерен в колоске (проявленный с силой $c^2_{53} = 0,2266^2$, $\text{смысл}(z_5)$). Этот смысл дополняет ранее выявленные постоянные знания, но его доля

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более неопределенна, чем доли u_6, u_5, u_4 . Изменчивость проявления фактора u_3 меньше дисперсии z -переменной ($=1$) ($\text{disp}(y_3)=0.9124 > \lambda_4=0.4525 > \lambda_5=0.3894 > 0.0132 = \text{disp}(y_6)=\lambda_6$). Это – формульное выражение заметного случайного факта: $z_1 \uparrow, z_5 \uparrow$.

Рассмотрим смысловое уравнение $\text{смысл}(y_2) = \text{смысл}(z_1) * (-0,2618) \oplus \text{смысл}(z_2) * (-0,052) \oplus \text{смысл}(z_3) * (-0,5719) \oplus \text{смысл}(z_4) * (-0,5645) \oplus \text{смысл}(z_5) * (-0,3311) \oplus \text{смысл}(z_6) * (0,4164)$. Здесь присутствуют 5 z -переменных. Они добавляют информации к смыслам ранее выявленных знаний из u_6, u_5, u_4 . резко выделяются «веса», относящиеся к u -переменной u_3 . Выделим уравнение $\text{смысл}(y_2) = \text{смысл}(z_4) * (-0,5645) \oplus \text{смысл}(z_5) * (-0,3311) \oplus \text{смысл}(z_6) * (0,4164)$. Так как $\text{corr}(z_3, z_4) = 0.9853$ (они дублируют друг друга, $z_{13} = 0.9853 z_{14}$), то исключим член $\text{смысл}(z_3) * (-0,5719)$ из смыслового уравнения. $\text{Смысл}(y_2)$ равен фразе «урожайность зерновой культуры, исчисляемая из средневзвешенного веса, определенного по значениям z -переменных z_4, z_5, z_6 ». Этот смысл также дополняет ранее выявленные постоянные знания, но его доля еще более неопределенна, чем доли u_6, u_5, u_4, u_3 . Изменчивость проявления фактора u_2 в 2 раза больше дисперсии z -переменной ($=1$), ($\text{disp}(y_2) = \lambda_2 = 1.9596 > \text{disp}(y_3) = 0.9124 > \lambda_4 = 0.4525 > \lambda_5 = 0.3894 > 0.0132 = \text{disp}(y_6) = \lambda_6$). Формульное выражение сильно заметного случайного факта: из-за заметных уровней сил проявлений факторов $\{z_4, z_5, z_6\}$ достигнут желаемый эффект – высокая урожайность сорта зерновой культуры.

Рассмотрим смысловое уравнение $\text{смысл}(y_1) = \text{смысл}(z_1) * (-0,5101) \oplus \text{смысл}(z_2) * 0,2655 \oplus \text{смысл}(z_3) * 0,382 \oplus \text{смысл}(z_4) * 0,3918 \oplus \text{смысл}(z_5) * (-0,4447) \oplus \text{смысл}(z_6) * 0,4149$. Здесь присутствуют 5 z -переменных. Резко выделяются «веса» z -переменных, относящиеся к u -переменной u_1 . Они добавляют информацию к смыслам ранее выявленных знаний из переменных u_6, u_5, u_4 . Прирост веса 1000 зерен (с силой $c^2_{61} = (0,4149)^2$, $\text{смысл}(z_6)$) является следствием

а) прироста веса одного зернышка (с силой $c^2_{41} = (0,3918)^2$, $\text{смысл}(z_4)$), является следствием
 б) уменьшения длины стебля (с силой $c^2_{11} = (-0,5101)^2$, $\text{смысл}(z_1)$), является следствием
 в) уменьшения числа зерен в колоске ((с силой $c^2_{51} = (-0,4447)^2$, $\text{смысл}(z_5)$).

Здесь отмечены причина и 3 следствия вычисленных изменчивостей. Изменчивость этого фактора u_1 высока: ($\text{disp}(y_1) = \lambda_1 = 2.2728 > \lambda_2 = 1.9596$). В нем содержится много случайных z -факторов (вливающих на другие u -факторы) и он не коррелирован с другими u -факторами u_2, u_3, u_4, u_5, u_6 . Его нужно анализировать отдельно от других факторов, он - не управляемый. Воздействие на один из факторов u_6, u_5, u_4 ведет к малому изменению дисперсии этого фактора, но не к изменению смысла. $\text{Смысл}(y_1) =$ «прирост веса одного зернышка является следствием прироста веса 1000 зерен, уменьшения длины стебля, уменьшения числа зерен в колоске». При коротком стебле слабо выражены все свойства, кроме веса одного зернышка. Формульное выражение заметного сильно случайного факта: из-за заметных уровней сил проявлений факторов $\{z_1, z_5, z_6\}$ достигнут желаемый эффект $\{z_1 \downarrow, z_5 \downarrow, z_6 \uparrow\} \Rightarrow \{z_4 \uparrow\}$ – высокая урожайность зерновой культуры. В Таблицу 4 сведены последовательности извлеченных знаний (в т.ч. в символической форме). Она отражает заметно сильную случайность (фактических видов работ селекционера: случайность не случайна) факта проявлений факторов $\{z_1, z_5, z_6\}$ позволивших достигнуть желаемого эффекта – заметно высокой урожайности нового сорта зерновой культуры. Из Таблицы 4 (сводная смысловая таблица модели) видна заметно сильная случайность факта проявлений факторов $\{z_1, z_5, z_6\}$, когда селекционер «поймал удачу» в результате своих спланированных видов работ. Чем больше вариабильность, тем больше шансов обнаружить желаемый результат.

Таблица 4. Извлеченные знания из 6-мерных данных о зерновой культуре нового сорта

№	% дисперсии	Смыслы независимых u -факторов, зависящих от смыслов z -факторов зерновой культуры	Динамика факторов	z -	Выводы
6	0.0132/6 = 0,2207%	$\text{смысл}(y_6) =$ «при слабо выраженной длине стебля выполняются закономерность: чем меньше число колосков на стебле тем больше вес зернышка»;	$z_3 \downarrow, z_4 \uparrow$		Постоянные мелкие факты: $z_3 \downarrow, z_4 \uparrow$
5	0.3894/6 = 6,4905%	$\text{смысл}(y_5) =$ «Чем короче длина стебля, тем меньше вес 1000 зерен»	$z_1 \downarrow, z_6 \downarrow$		Постоянные мелкие факты: $z_1 \downarrow, z_6 \downarrow$
4	0.4525/6	$\text{смысл}(y_4) =$ «При заметном росте длины	$z_1 \uparrow \Rightarrow \{z_5 \downarrow, z_6 \downarrow\}$		Постоянное

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	GIF (Australia) = 0.564	ESJI (KZ) = 8.771	IBI (India) = 4.260
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	=7,5419%	стебля: меньшему числу зерен в колоске соответствует меньший вес 1000 зерен»		проявление причин и следствий: $z_1 \uparrow \Rightarrow \{z_5 \downarrow, z_6 \downarrow\}$
3	0.9124/6 =15,2067%	смысл(y_3)= «Колос очень большой длины имеет заметное число зерен в колоске»= «большая озерненность»	$z_1 \uparrow, z_5 \uparrow$	Заметные менее случайные факты: $z_1 \uparrow, z_5 \uparrow$
2	1.9596/6 =32,6600%	Смысл(y_2)=«урожайность культуры, исчисляется из средневзвешенного веса, определенного по значениям z -переменных z_4, z_5, z_6 », включая озерненность	$\{z_4, z_5, z_6\} \Rightarrow$ Желаемый эффект	Сильно заметные случайные факты: $\{z_4, z_5, z_6\} \Rightarrow$ Желаемый эффект
1	2.2728/6 =37,8818%	Смысл(y_1)=«Прирост веса 1000 зерен является следствием прироста веса одного зернышка, уменьшения длины стебля, уменьшения числа зерен в колоске»	$\{z_1 \downarrow, z_5 \downarrow, z_6 \uparrow\} \Rightarrow$ $\{z_4 \uparrow\}$. Подтверждающие факты для урожайности	Заметные сильно случайные факты: $\{z_1 \downarrow, z_5 \downarrow, z_6 \uparrow\} \Rightarrow$ $\{z_4 \uparrow\}$ =урожайность.

Вычисленные по реальным данным числовые матрицы z -, y - и x -отклонений и их дисперсии

Вычисленные по реальным данным числовая матрица Z_{m6} z -отклонений определяет матрицу Y_{m6} y -отклонений:

$$y_1 = z_1(-0.5101) + z_2(-0.2618) + z_3 \cdot 0.1066 + z_4 \cdot 0.3356 + z_5(-0.7395) + z_6 \cdot 0.0193;$$

$$y_2 = z_1 \cdot 0.2655 + z_2(-0.0520) + z_3 \cdot 0.9503 + z_4 \cdot 0.1491 + z_5 \cdot 0.0399 + z_6(-0.0025);$$

$$y_3 = z_1 \cdot 0.3820 + z_2(-0.5719) + z_3 + z_1(-0.1372) + z_4 \cdot 0.0088 + z_5(-0.0953) + z_6(-0.7064);$$

$$y_4 = z_1 \cdot 0.3918 + z_2(-0.5645) + z_3(-0.1239) + z_4(-0.0665) + z_5(-0.1000) + z_6 \cdot 0.7057;$$

$$y_5 = z_1(-0.4447) + z_2(-0.3311) + z_3 \cdot 0.2266 + z_4(-0.7942) + z_5 \cdot 0.0951 + z_6(-0.0392);$$

$$y_6 = z_1 \cdot 0.4149 + z_2 \cdot 0.4164 + z_3 \cdot 0.0093 + z_4(-0.4795) + z_5(-0.6507) + z_6(-0.0328).$$

Для наших переменных верны смысловые равенства вышеприведенного вида.

Так как $\text{смысл}(z_{ij}) = \text{смысл}(z_{ij} * s_j)$, то система многосмысловых уравнений преобразуется в систему многосмысловых уравнений с семантическими переменными $\text{смысл}(x_1), \dots, \text{смысл}(x_6)$. Новой системе 6-ти смысловым уравнений соответствует своя математическая модель вида $Y_{m6} = X_{m6} C_{66}$, где вновь полученная для визуализации взаимных динамик x - и зависящих от них новых y -переменных из матрицы $Y_{m6} = X_{m6} C_{66}$ отличается от матрицы $Y_{m6} = Z_{m6} C_{66}$, не пригодной для конструирования смыслов 6 y -факторов зерновой культуры. Описание конструирования фраз для 6 переменных: $\text{смысл}(y_1)$, $\text{смысл}(y_2)$, $\text{смысл}(y_3)$, ..., $\text{смысл}(y_6)$ дано выше. Визуализация взаимных динамик x - и y -переменных. Для визуализации x -отклонений нужна матрица $X_{m6} = Z_{m6} S_{66}$, где матрица $S_{66} = \text{diag}(27.8657, 0.2626, 17.9091, 4.4853, 4.4868, 26.2124)$ содержит значения стандартных отклонений x -переменных. Покажем: при

переходе к матрице $X_{m6} = Z_{m6} S_{66}$ сохраняются как смысловое матричное равенство, так и матрица C_{66} собственных векторов.

Матрица C_{66} (Таблица 2) является матрицей собственных векторов c_1, \dots, c_6 , вычисленной из матрицы (z, z) -корреляций $R_{66} = (1/m) Z_{m6}^T Z_{m6}$: $R_{66} C_{66} = C_{66} \Lambda_{66}$, $C_{66}^T C_{66} = I_{66}$, $C_{66} C_{66}^T = I_{66} = \text{diag}(2.2728, 1.9596, 0.9124, 0.4525, 0.3894, 0.0132)$.

Матрица X_{m6} имеет ковариационную матрицу $W_{66} = (1/m) X_{m6}^T X_{m6}$ и для нее назначим ту же матрицу собственных векторов C_{66} : $R_{66} = S_{66}^{-1} W_{66} S_{66}$, $S_{66}^{-1} C_{66} = C_{66} \Lambda_{66}$, тогда имеем $W_{66} S_{66}^{-1} C_{66} = S_{66} C_{66} \Lambda_{66}$. Формула $W_{66} S_{66}^{-1}$ из этого равенства означает: диагональные элементы матрицы $W_{66} = (1/m) X_{m6}^T X_{m6}$ равны 1, а ее внедиагональные элементы умножили ее значение коэффициента корреляции на разные числа. Переход от z -изменчивостей (матрицы Z_{m6}) к x -отклонениям (к матрице X_{m6}) без потери сконструированных новых смыслов y -переменных при назначенной матрице собственных векторов C_{66} для матрицы $W_{66} = (1/m) X_{m6}^T X_{m6}$, которая будет иметь матрицу собственных чисел, выделяемую (если сможем) из произведения матриц $S_{66} C_{66} \Lambda_{66}$. Вычислим матрицу $X_{m6} = Z_{m6} S_{66}$. На графиках [3] взаимных динамик кривых новые y -переменные с новыми дисперсиями $\text{disp}(y_1) = s_1 \lambda_1$, $\text{disp}(y_2) = s_2 \lambda_2$, ..., $\text{disp}(y_6) = s_6 \lambda_6$, их значения: $s_1 = 27.8657$, $s_2 = 0.2626$, $s_3 = 17.909$, $s_4 = 4.4853$, $s_5 = 4.4868$, $s_6 = 26.2124$. «Вес» из матрицы C_{66} при z -изменчивостях участвуют при вычислении значений 6 x -отклонений $x_1, x_2, x_3, \dots, x_6$, при этом x -отклонения $x_1, x_2, x_3, \dots, x_6$ имеют те же смыслы, что и z -изменчивости, т.е. смыслы x -отклонений являются преобразованным решением смыслового матричного уравнения вида $\text{смысл}(Y_{m6}) = \text{смысл}(X_{m6} C_{66})$. Нахождение решения проводилось при анализе другого матричного уравнения вида $\text{смысл}(Y_{m6}) = \text{смысл}(Z_{m6} C_{66})$ и конструируются фразы для семантических переменных

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смысл(y_1)=«...» ..., смысл(y_6)=«...». После этого, так как смысл(z_{ij})=смысл($z_{ij} * s_j$), то система многосмысловых уравнений преобразуется в систему многосмысловых уравнений с семантическими переменными смысл(x_1),..., смысл(x_6) [4-5]. А соответствующая числовая модель $Y_{m6}=X_{m6}C_{66}$ становится удобной для визуализации x -отклонений ($z_{ij} * s_j = x_{ij}^{0,ij} - x^{me}$) от средних. Матрица Z_{m6} нужна для нахождения новых смыслов, матрица X_{m6} – для визуализации.

Визуализация взаимных динамик z -, x -, y -отклонений факторов, вычисленных в познающей модели

В познающей модели о вычисляемых смыслах 6 некоррелированных y -факторов нового сорта зерновой культуры были вычислены матрицы Y_{m6} , Z_{m6} , $X_{m6}=Z_{m6}S_{66}$, $Y_{m6}=Y_{m6}S_{66}$, $Y_{mn}=Z_{m6}C_{66}$, $\Lambda_{66}=(1/m)Y_{m6}^T Y_{m6}$. На Рисунках 1-14 показаны разные группы взаимных динамик x -, y -

кривых, дающих дополнительные знания об x -, y -отклонениях факторов с «весеми» в познающей модели зерновой культуры нового сорта. Количество $z=x/s$ шагов (длина одного шага равна s_j - одному стандартному отклонению), присущих фактору с номером j в i -ой делянке, равно z_{ij} (Таблица 5), а абсолютная величина отклонения от среднего значения равно $x_{ij}^{0,ij} - x^{me} = x_{ij} = z_{ij}s_j$ (Таблица 6). Сравнение z -шагов позволяет узнать сколько раз ($z_{ij}s_j$) делают шаги факторы (в обе стороны от 0), если выделенный фактор делает 1 шаг длиной s_j . Количество z -шагов $z_{ij}=x_{ij}/s_j$ является одним из измерителей изменчивости. А величины отклонений от средних значений ($x_{ij}=z_{ij}s_j$) показывают на сколько отличаются друг от друга объемы задолженностей, которые отличаются от своих средних значений (Таблицы 7-8).

Таблица 5. Матрица Z_{m6} z -изменчивостей (количества z -шагов)

№	z_1	z_2	z_3	z_4	z_5	z_6
1	-0.03589	-1.05114068	-0.2713	-0.2882	-0.3926	0.772536
2	-0.75361	-0.59412299	-0.4567	-0.3479	-0.6222	1.917035
3	-0.03589	2.681170428	-0.4595	-0.3455	0.33398	0.009537
4	-0.57418	-1.05114068	-0.4506	-0.3426	-0.0917	0.391037
5	-0.57418	-0.82263184	-0.3808	-0.3091	0.83546	-1.211261
6	0.32298	0.319912381	-0.4399	-0.3183	-0.5887	-0.562712
7	-0.57418	0.967354103	-0.1155	-0.1923	-0.1965	0.467337
8	-0.75361	-0.89880145	0.07097	0.05675	-0.1229	-0.944211
9	-0.75361	0.015233923	0.60198	0.0291	-0.2188	0.085837
10	0.86127	-0.21327492	0.01457	-0.2318	0.06653	-1.59276
11	-0.93305	1.081608525	-0.4277	-0.331	-0.6222	1.573685
12	-0.93305	0.929269296	4.10578	4.26897	-0.1207	-0.028612
13	0.14355	-0.59412299	-0.3584	-0.3339	-0.1541	1.154036
14	-0.21532	1.690965441	-0.3311	-0.3076	-0.0494	0.009537
15	1.75843	0.205657959	0.75554	0.51023	-0.0962	-0.371962
16	2.11729	-0.59412299	-0.2199	-0.251	-0.2767	-1.134961
17	-0.57418	0.281827573	-0.4606	-0.3455	-0.6222	1.344786
18	-0.75361	-0.70837741	-0.3059	-0.2712	-0.5174	0.200287
19	2.47616	-0.59412299	-0.4076	-0.3049	4.07832	-1.70721
20	-0.21532	-1.05114068	-0.4634	-0.3446	-0.6222	-0.371962
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

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	JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

Таблица 6. Матрица $Y_{m6} = Z_{m6}C_{66}$ у-изменчивостей (кол-во у-шагов отклонений)

	Y ₁	Y ₂	Y ₃	Y ₄	Y ₅	Y ₆
1	0.017799	0.833558349	-1.01158	-0.21068	-0.50076	-0.0197119
2	0.987963	1.690020466	-0.66232	-0.74755	-0.69468	0.025539
3	0.274718	0.221155305	2.725703	0.13676	0.23741	0.0599909
4	-0.089487	0.84921997	-0.97299	-0.44534	0.19669	0.058841
5	-1.066159	-0.195640496	-0.57437	-0.38093	1.3266	0.0487762
6	-0.344226	0.290684591	0.299595	0.91071	0.15784	0.13315
7	0.711518	0.534285474	0.857571	-0.10479	0.17066	-0.0752177
8	-0.141962	-0.181059066	-0.98787	0.16031	1.11171	0.0134042
9	0.762716	-0.056025542	-0.20083	-0.1147	0.42097	-0.4135276
10	-1.271615	-0.777154244	-0.08389	0.98363	0.4191	-0.1070522
11	1.399673	1.480716458	0.901725	-0.39414	-0.27617	0.0205955
12	4.005457	-4.533935419	-0.33623	-0.31191	-0.08397	0.097628
13	0.04866	0.918330905	-0.48294	-0.45239	-0.8279	-0.0099752
14	0.33773	0.351705676	1.656401	0.23197	0.2781	0.0100577
15	-0.46541	-1.314210086	0.190757	0.84835	-1.18229	-0.1242473
16	-1.767993	-0.636898338	-0.35087	1.40066	-0.83118	0.0686332
17	0.891042	1.360062138	0.184134	-0.28253	-0.41993	0.0500737
18	0.286407	0.816909672	-0.79331	-0.02835	0.40578	0.025654
19	-4.217918	-2.273391318	0.701326	-1.66135	-0.28677	0.0181456
20	-0.358913	0.621665505	-1.06002	0.46226	0.37877	0.119243
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	2.2649	1.9645	0.9179	0.4530	0.3866	0.0132
	1.5049	1.4016	0.9581	0.6730	0.6218	0.1150

Таблица 7. Матрица X_{m6} x-отклонений от средних

№	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆
1	-1.0000	-0.2760	-4.8590	-1.2925	-1.7615	20.2500
2	-21.0000	-0.1560	-8.1790	-1.5605	-2.7915	50.2500
3	-1.0000	0.7040	-8.2290	-1.5495	1.4985	0.2500
4	-16.0000	-0.2760	-8.0690	-1.5365	-0.4115	10.2500
5	-16.0000	-0.2160	-6.8190	-1.3865	3.7485	-31.7500
6	9.0000	0.0840	-7.8790	-1.4275	-2.6415	-14.7500
7	-16.0000	0.2540	-2.0690	-0.8625	-0.8815	12.2500
8	-21.0000	-0.2360	1.2710	0.2545	-0.5515	-24.7500
9	-21.0000	0.0040	10.7810	0.1305	-0.9815	2.2500
10	24.0000	-0.0560	0.2610	-1.0395	0.2985	-41.7500
11	-26.0000	0.2840	-7.6590	-1.4845	-2.7915	41.2500
12	-26.0000	0.2440	73.5310	19.1475	-0.5415	-0.7500
13	4.0000	-0.1560	-6.4190	-1.4975	-0.6915	30.2500
14	-6.0000	0.4440	-5.9290	-1.3795	-0.2215	0.2500
15	49.0000	0.0540	13.5310	2.2885	-0.4315	-9.7500
16	59.0000	-0.1560	-3.9390	-1.1260	-1.2415	-29.7500
17	-16.0000	0.0740	-8.2490	-1.5495	-2.7915	35.2500
18	-21.0000	-0.1860	-5.4790	-1.2165	-2.3215	5.2500
19	69.0000	-0.1560	-7.2990	-1.3675	18.2985	-44.7500

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20	-6.0000	-0.2760	-8.2990	-1.5455	-2.7915	-9.7500
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	776.5	0.068944	320.737	20.1177	20.1311	687.0875
	27.8657	0.262571895	17.9091	4.48528	4.48677	26.21235

Таблица 8. Матрица $Y_{m6}=X_{m6}C_{66} Y$ -отклонений от нуля

№	Y1	Y2	Y3	Y4	Y5	Y6
1	7,259356	12,79994889	0,247079	-8,64445	-12,0234	1,9065388
2	29,02501	32,91273589	-1,23657	-28,9169	-16,5044	2,7327352
3	-3,616208	5,413982388	2,225295	-1,50999	1,68659	4,6314999
4	8,839692	14,08950089	-0,66837	-9,96764	6,0348	3,987472
5	-9,88386	-5,579345113	-0,24938	6,87745	33,6281	4,424705
6	-13,08276	-2,316057613	1,561349	12,229	3,58809	5,3191933
7	12,57529	11,23848489	-1,15932	-10,4664	4,07065	0,1762128
8	1,211164	-5,483790613	-3,02393	5,2171	31,4259	-0,2895073
9	16,25264	0,520131388	-3,93161	-7,26018	12,9318	-7,9642221
10	-30,01965	-23,32630361	2,27753	27,8995	9,52395	0,9031109
11	28,18665	30,11096589	-1,5159	-26,2143	-6,99016	2,6166404
12	48,84785	-46,20005411	-15,1302	-8,52577	10,751	-38,886473
13	7,737648	16,30231839	1,469008	-12,5935	-21,9522	2,5901103
14	0,575352	5,894659388	0,718842	-1,8518	4,97396	3,0983229
15	-22,76846	-25,77828961	2,946262	21,4372	-31,4484	-6,6610065
16	-43,87435	-24,52660036	6,263093	35,0685	-23,9085	4,1514658
17	20,28965	25,37959939	-0,61626	-20,0135	-10,4266	3,3778709
18	11,30372	12,28236089	-1,99014	-7,71629	12,5289	2,525867
19	-65,26643	-37,80238361	12,10827	30,0848	-19,3404	6,2735753
20	-3,592308	4,068136388	-0,295	4,86713	11,4503	5,0858887
	0,0000	0,0000	0,0000	0,0000	0,0000	0,0000
	653,8184	453,0210	23,6731	308,8686	293,2293	92,0308
	25,5699	21,2843	4,8655	17,5747	17,1239	9,5933

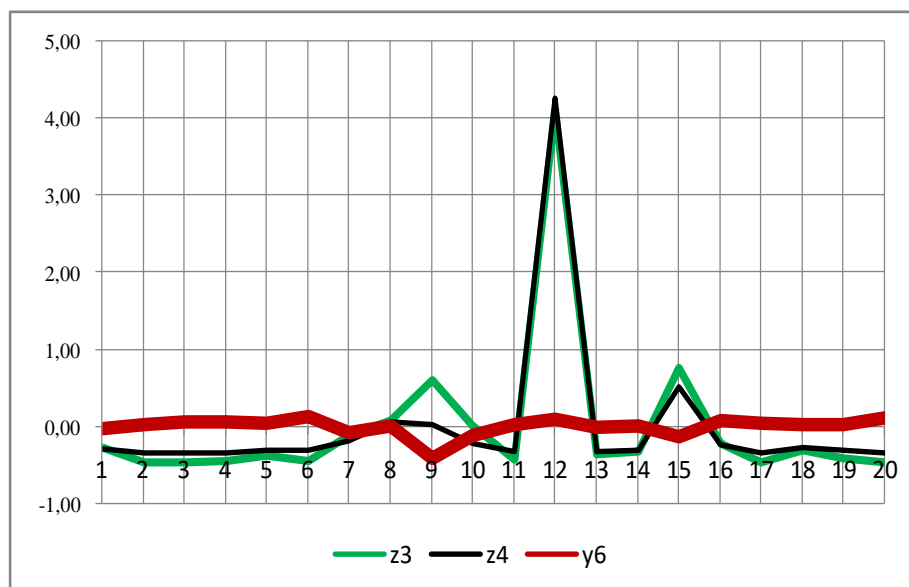


Рисунок 1. Взаимная динамика отклонений z-переменных z3, z4, влияющих на «при слабо выраженной длине стебля выполняется закономерность: чем меньше число колосков на стебле тем больше вес зернышка»

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JIF = 1.500	SJIF (Morocco) = 7.184	OAJI (USA) = 0.350

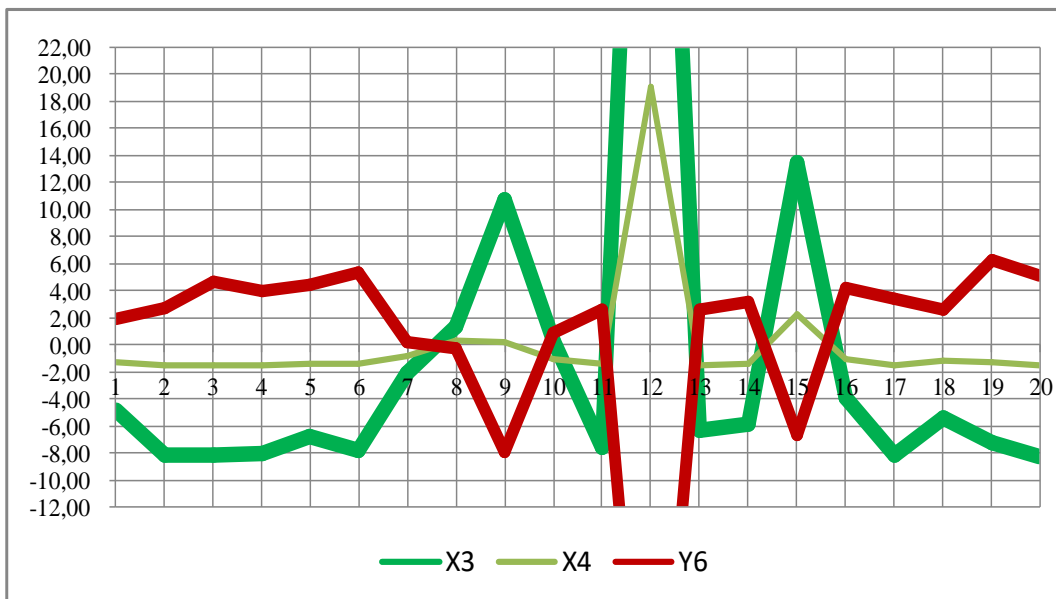


Рисунок 2. Взаимная динамика отклонений x-переменных X₃, X₄, влияющих на «при слабо выраженной длине стебля выполняется закономерность: чем меньше число колосков на стебле тем больше вес зернышка» (Y₆)

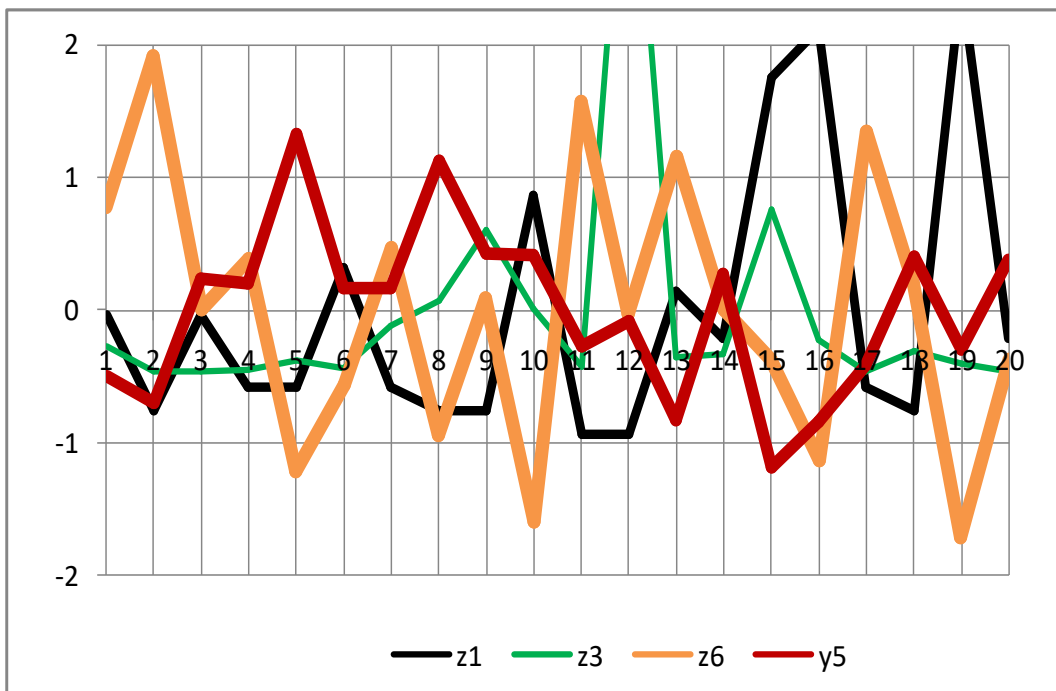


Рисунок 3. Взаимная динамика отклонений z-переменных z₁, z₆, влияющих на «Чем короче длина стебля, тем меньше вес 1000 зерен» (y₅)
 $y_5 = z_1(-0.4447) + z_2(-0.3311) + z_3 0.2266 + z_4(-0.7942) + z_5 0.0951 + z_6(-0.0392)$;

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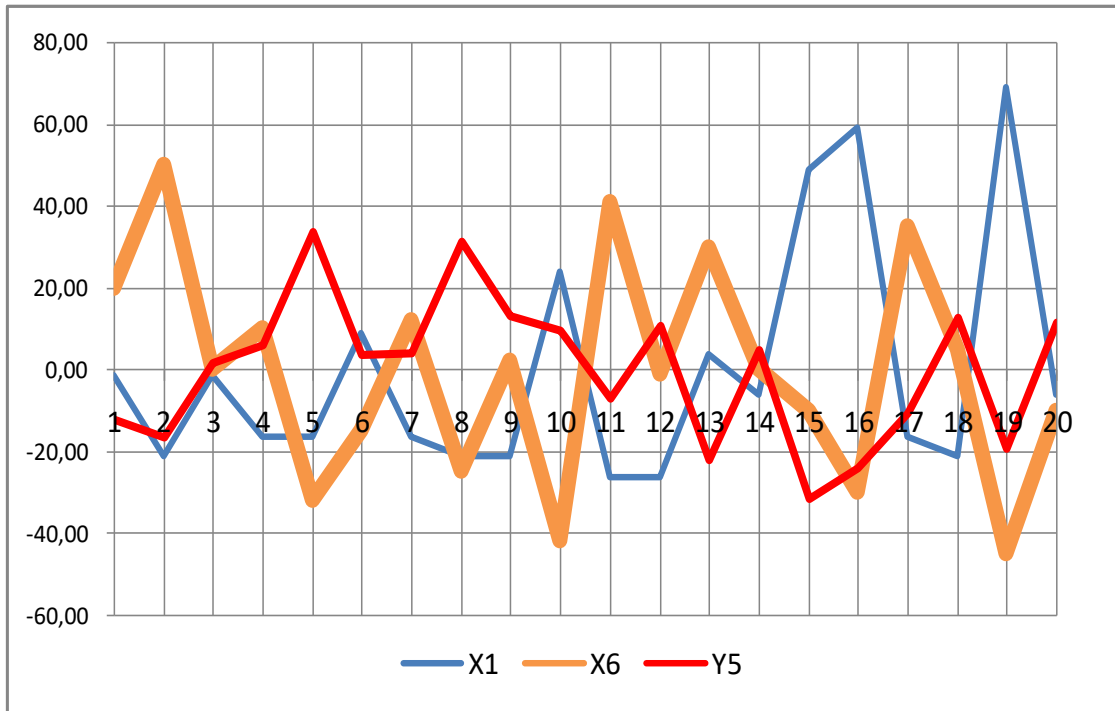


Рисунок 4. Взаимная динамика отклонений x-переменных X₁, X₆, влияющих на «» (Y₅)
 $Y_5 = X_1(-0.4447) + X_2(-0.3311) + X_3 0.2266 + X_4(-0.7942) + X_5 0.0951 + X_6(-0.0392)$

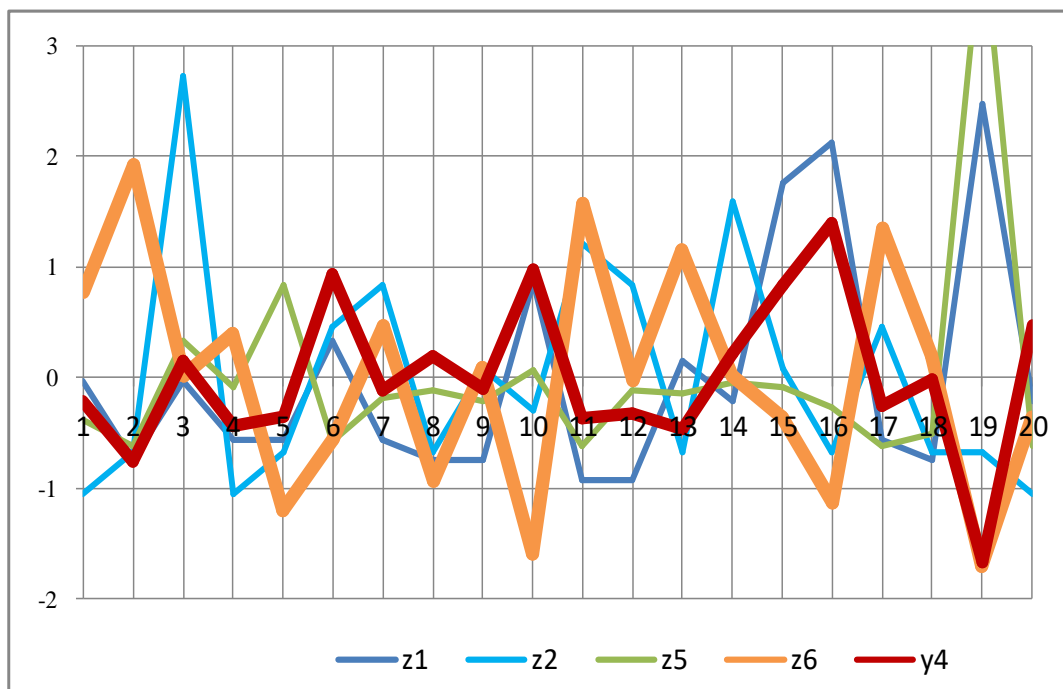


Рисунок 5. Взаимная динамика отклонений z-переменных z₁, z₂, z₅, z₆, влияющих на «При заметном росте длины стебля: меньшему числу зерен в в колоске соответствует меньший вес 1000 зерен» (y₄)
 $y_4 = z_1 0.3918 + z_2(-0.5645) + z_3(-0.1239) + z_4(-0.0665) + z_5(-0.1000) + z_6 0.7057$

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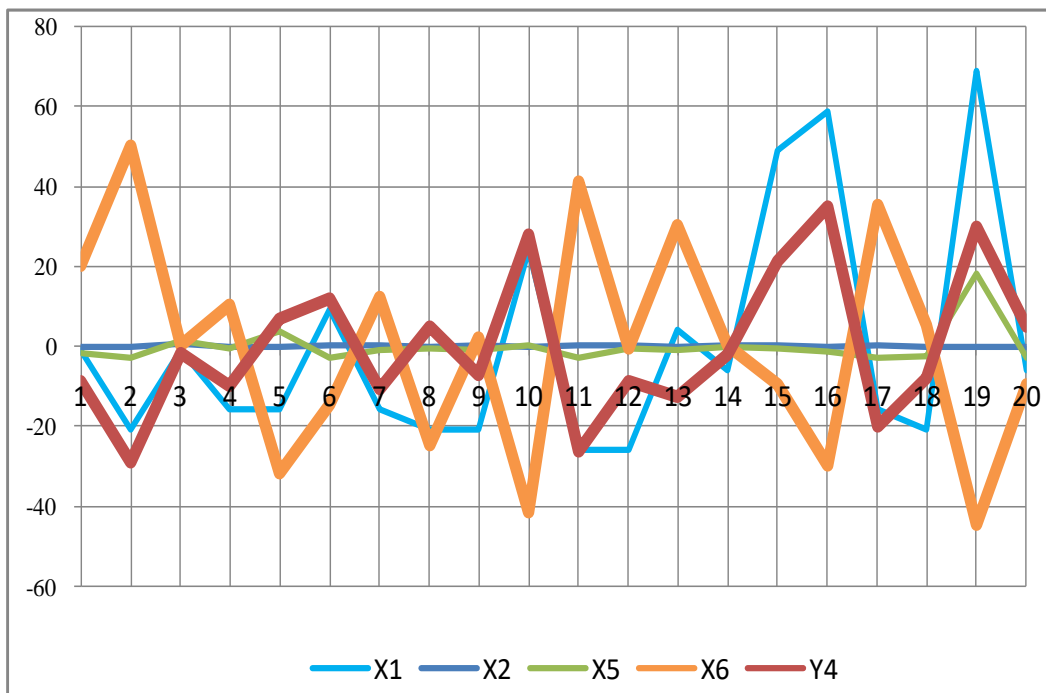


Рисунок 6. Взаимная динамика отклонений x-переменных X₁, X₂, X₅, X₆, влияющих на «При заметном росте длины стебля: меньшему числу зерен в в колоске соответствует меньший вес 1000 зерен» (Y₄)
 $Y_4 = X_1 \cdot 0.3918 + X_2 \cdot (-0.5645) + X_3 \cdot (-0.1239) + X_4 \cdot (-0.0665) + X_5 \cdot (-0.1000) + X_6 \cdot 0.7057$

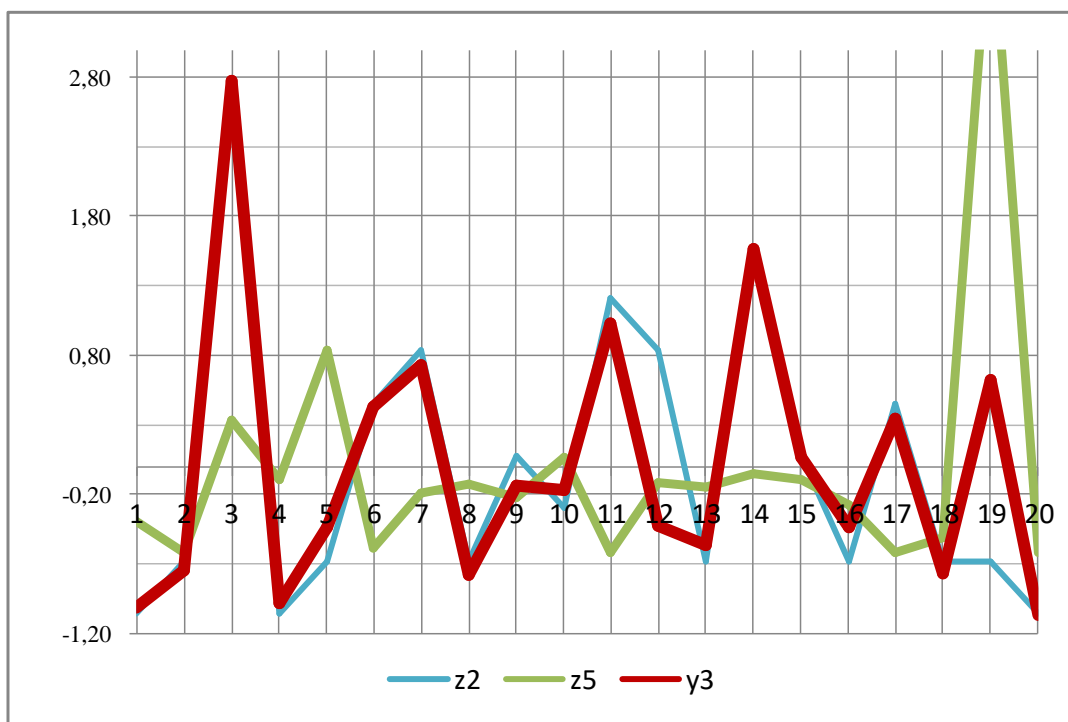


Рисунок 7. Взаимная динамика отклонений z-переменных z₂, z₅, влияющих на «Колос очень большой длины имеет заметное число зерен в колоске» (y₃)
 $y_3 = z_1 \cdot 0.3820 + z_2 \cdot (-0.5719) + z_3 + z_1 \cdot (-0.1372) + z_4 \cdot 0.0088 + z_5 \cdot (-0.0953) + z_6 \cdot (-0.7064)$

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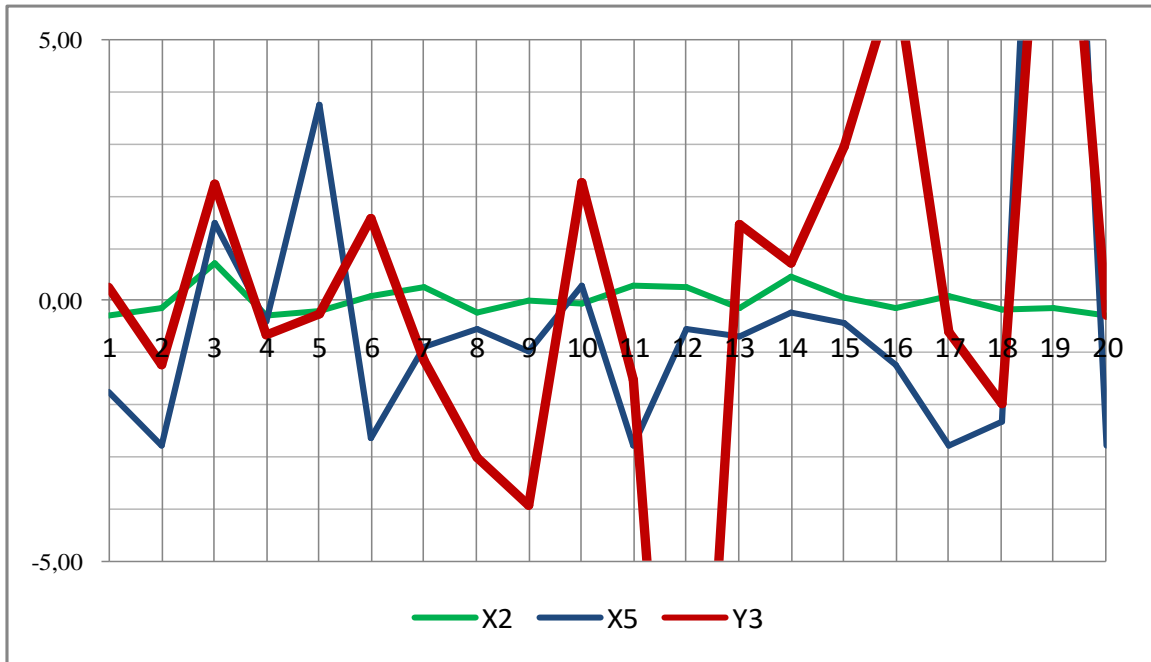


Рисунок 8. Взаимная динамика отклонений x-переменных X₂, X₅, влияющих на «Колос очень большой длины имеет заметное число зерен в колоске» (Y₃)

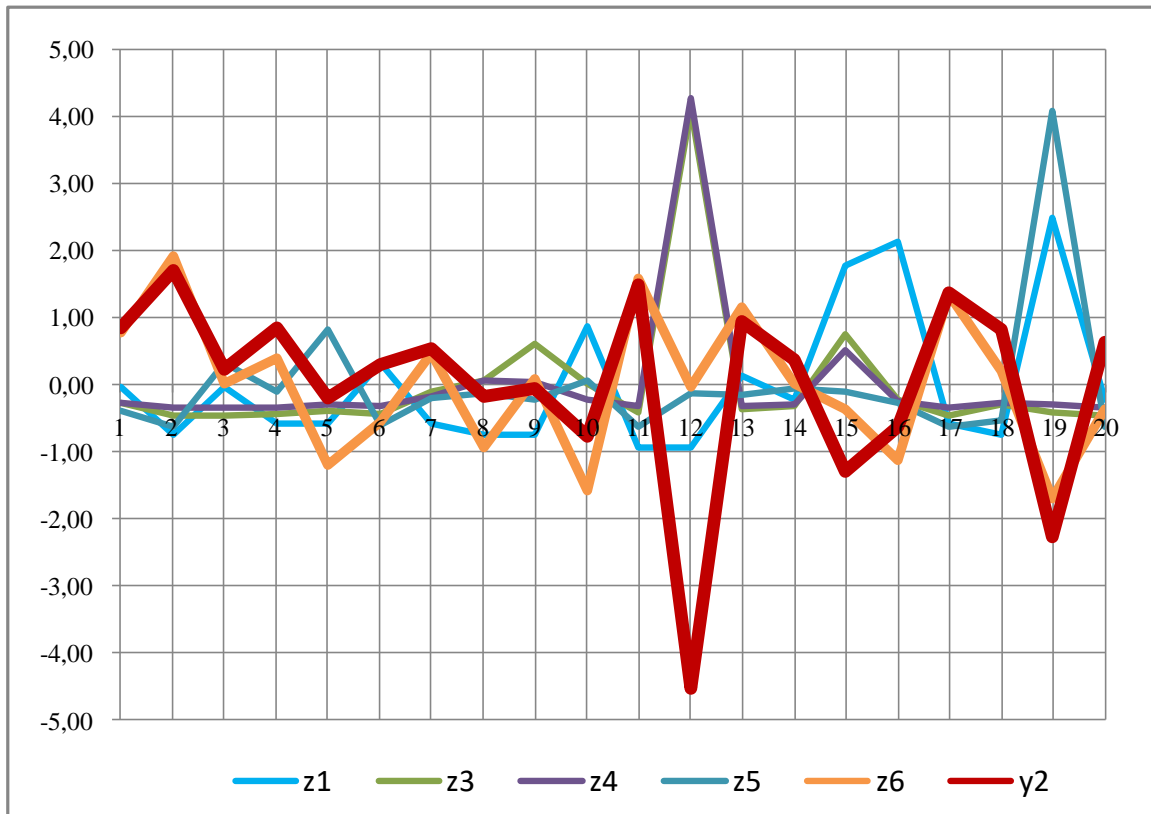


Рисунок 9. Взаимная динамика отклонений z-переменных z₁, z₃, z₄, z₅, z₆ влияющих на «урожайность культуры, исчисляется из средневзвешенного веса, определенного по значениям z-переменных z₄, z₅, z₆» (y₂)

$$y_2 = z_1 \cdot 0.2655 + z_2 \cdot (-0.0520) + z_3 \cdot 0.9503 + z_4 \cdot 0.1491 + z_5 \cdot 0.0399 + z_6 \cdot (-0.0025)$$

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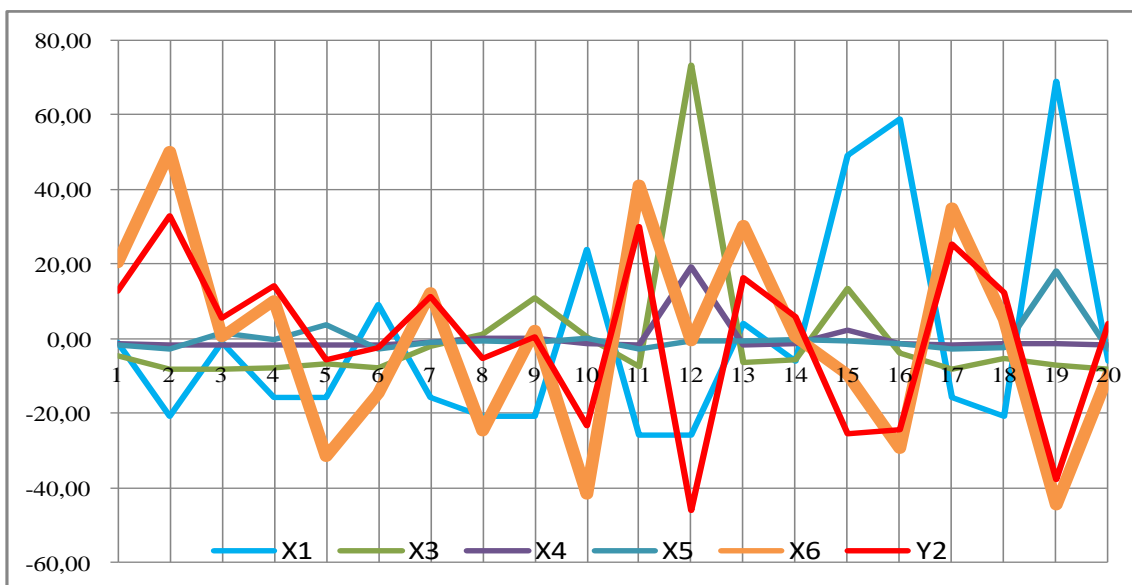


Рисунок 10. Взаимная динамика отклонений z-переменных X₁, X₃, X₄, X₅, X₆ влияющих на «урожайность культуры, исчисляется из средневзвешенного веса, определенного по значениям X-переменных X₄, X₅, X₆» (y₂)

$$Y_2 = X_1 \cdot 0.2655 + X_2 \cdot (-0.0520) + X_3 \cdot 0.9503 + X_4 \cdot 0.1491 + X_5 \cdot 0.0399 + X_6 \cdot (-0.0025)$$

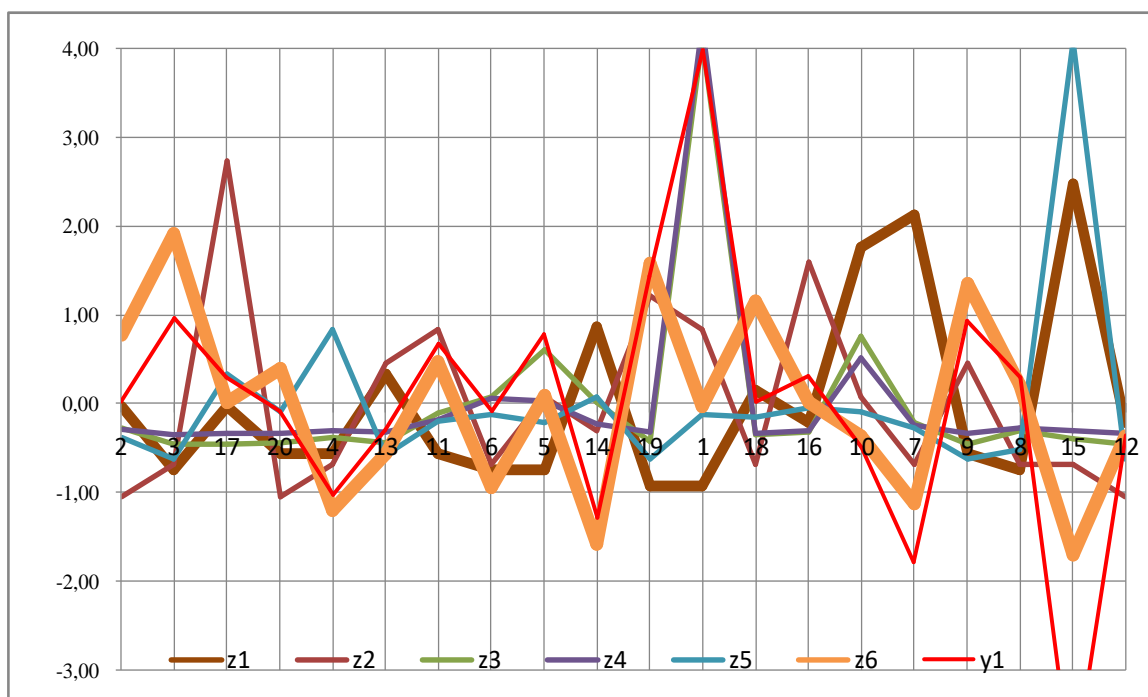


Рисунок 11. Взаимная динамика отклонений z-переменных z₁, z₂, z₃, z₄, z₅, z₆ влияющих на фактор «Прирост веса 1000 зерен является следствием прироста веса одного зернышка, уменьшения длины стебля, уменьшения числа зерен в колоске»

$$y_1 = z_1 \cdot (-0.5101) + z_2 \cdot (-0.2618) + z_3 \cdot 0.1066 + z_4 \cdot 0.3356 + z_5 \cdot (-0.7395) + z_6 \cdot 0.0193$$

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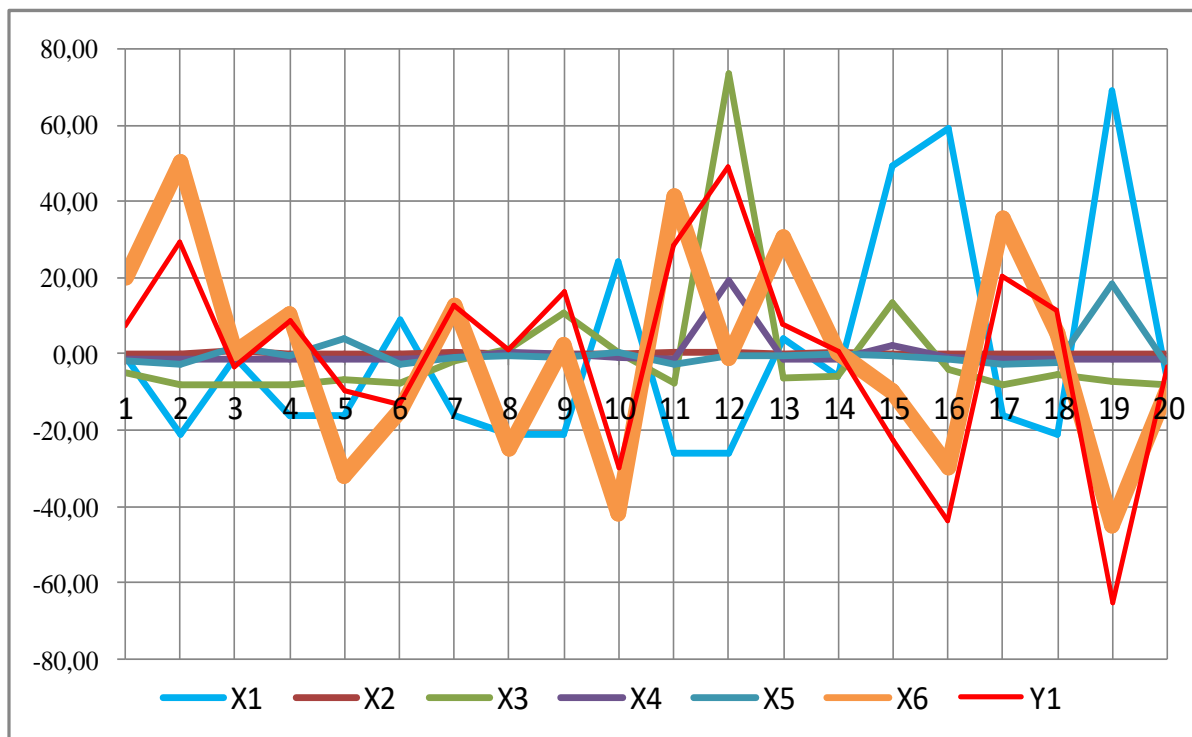


Рисунок 12. Взаимная динамика отклонений x-переменных $X_1, X_2, X_3, X_4, X_5, X_6$, влияющих на фактор «Прирост веса 1000 зерен является следствием прироста веса одного зернышка, уменьшения длины стебля, уменьшения числа зерен в колоске»

$$Y_1 = X_1(-0.5101) + X_2(-0.2618) + X_3(0.1066) + X_4(0.3356) + X_5(-0.7395) + X_6(0.0193)$$

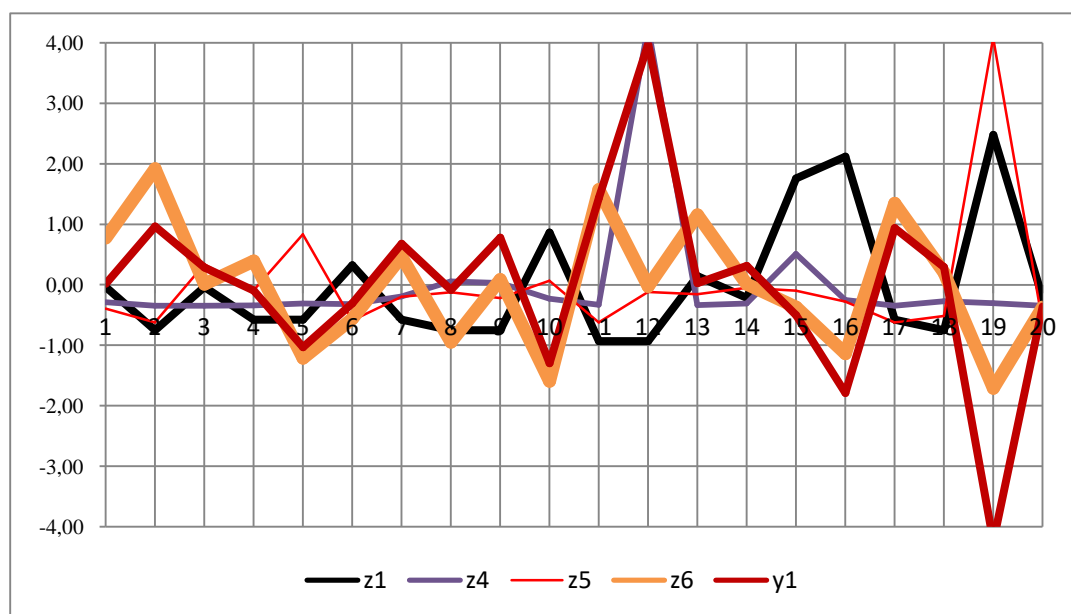


Рисунок 13. Взаимная динамика отклонений z-переменных z_1, z_4, z_5, z_6 , влияющих на «Прирост веса 1000 зерен, зависящего от прироста веса одного зернышка, от уменьшения длины стебля, от уменьшения числа зерен в колоске» (смысл(y_1)=смысл(z_1)*(-0,5101)⊕
смысл(z_4)*0,3918⊕смысл(z_5)*(-0,4447)⊕ смысл(z_6)*0,4149)

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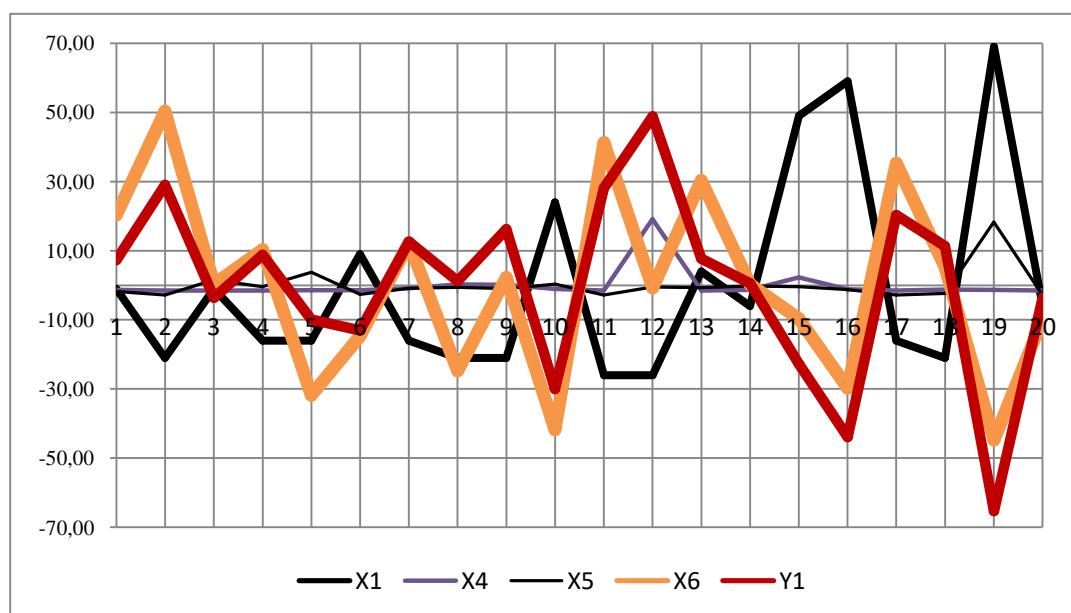


Рисунок 14. Взаимная динамика х-отклонений от нуля (X-переменных) X_1, X_4, X_5, X_6 , влияющих на фактор $Y_1 = X_1(-0.5101) + X_4 * 0.3356 + X_5 * (-0.7395) + X_6 * 0.0193$

Заключение

Выше разработана Когнитивная модель выявленных смысловых и количественных проявлений факторах зерновой культуры нового сорта. Удалось реализовать, обосновать их формульное [6], фразеологическое [6], визуализированное на графиках описания поведений кривых. Разработана система из 6 смысловых уравнений с $12=6+6$ семантическими переменными: $\text{смысл}(y_1), \text{смысл}(y_2), \text{смысл}(y_3), \text{смысл}(y_4), \text{смысл}(z_1), \dots, \text{смысл}(z_6)$, удовлетворяющих матричному смысловому равенству вида $\text{смысл}(Y_{m6}) = \text{смысл}(Z_{m6}C_{66})$. Этому матричному смысловому равенству соответствует матричное равенство для числовых z-, y-переменных, смоделированных в виде матриц: $Y_{m6} = Z_{m6}C_{66}$. Шесть семантических решений-знаний суть новые извлеченные знания, они познают смыслы, парные связи, силы проявлений 12 семантических переменных. Визуализация взаимных динамик кривых (значений изменчивостей z-, y-переменных, x-отклонений из матриц $(Z_{m8}, Y_{m6}), (X_{m6}, Y_{m6} = X_{m6}C_{66})$. Особенность нашей модели состоит в равенстве количества z-переменных количеству y-переменных. В

когнитивных моделях [7-13] количества z-переменных больше или меньше количества y-переменных, соответственно решаются другие задачи с их матричными смысловыми равенствами.

Введенные в модель переменные наделены математическими и статистическими свойствами, а параметры постоянны. Смыслы объясняющих факторов меняют свою степень изменчивости (Таблица 4) от постоянной до сильно случайной (6 градаций). С наименьшей дисперсией – «постоянные мелкие факты», затем (с чуть большей дисперсией) – «другие постоянные мелкие факты». Далее модель обнаруживает «постоянные проявления причины и следствия», «заметные мало случайные факты», «сильно заметные случайные факты в виде «желаемый эффект». Наибольшей степени изменчивости объясняющего y-фактора соответствуют заметные сильно случайные факты, подтверждающие приемлемую урожайность сорта.

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Article



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STRENGTHENING THE MATHEMATICAL KNOWLEDGE OF PRIMARY CLASS STUDENTS BY ENSURING CONTINUITY IN THE EDUCATIONAL PROCESS

Abstract: In this article, ideas on strengthening students' knowledge based on ensuring continuity in the educational system are presented. The views on the criteria for ensuring positivity in the educational process are based.

Key words: conception, continuing education, state education standards, conception, thinking, inverse problem.

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УКРЕПЛЕНИЕ МАТЕМАТИЧЕСКИХ ЗНАНИЙ УЧАЩИХСЯ НАЧАЛЬНЫХ КЛАССОВ ПУТЕМ ОБЕСПЕЧЕНИЯ НЕПРЕРЫВНОСТИ В ОБРАЗОВАТЕЛЬНОМ ПРОЦЕССЕ

Аннотация: В данной статье представлены идеи по укреплению знаний студентов на основе обеспечения преемственности в образовательной системе. Обосновываются взгляды на критерии обеспечения позитивности в образовательном процессе.

Ключевые слова: концепция, непрерывное образование, государственные образовательные стандарты, концепция, мышление, обратная задача.

Введение

Одним из важных условий эффективной реализации Национальной программы подготовки кадров является то, что все виды системы непрерывного образования, действующие в нашей стране, работают в непрерывном режиме. В образовании единство используется в двух смыслах. Во-первых, единство между видами образования. При этом содержание следующего вида образования должно не только продолжать предыдущее, но и частично повторять его и продолжать в следующем виде образования, органически связанное по содержанию. Во-

вторых, согласованность учебных предметов. Обычно это считают междисциплинарной связью.

В настоящее время подчеркивается жизненная необходимость обеспечить преподавание предметов, в том числе математики, на принципах целостности и преемственности в начальном образовании.

Определение приоритетов системного реформирования общего среднего и внешкольного образования в Республике Узбекистан, поднятия нравственного, нравственного и интеллектуального развития молодого поколения на новый уровень качества образования. Постановление Президента

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Республики Узбекистан О концепции развития системы государственного образования Республики Узбекистан до 2030 года (№ПФ-5712 от 29.09.2019 года) в целях внедрения инновационных форм и методов обучения.

Концепция определяет основные направления долгосрочного развития системы народного образования. В частности, в концепции 2030 года Республика Узбекистан войдет в число первых 30 стран с рейтингом международной программы PISA (The Program for International Student Assessment), внедрением современных информационных технологий и внедрением коммуникационных технологий и инноваций. проекты в области национального образования.

Японцы говорят, что если вы научитесь сами, то запомните 90% того, что выучите. Если учителя только встают и читают лекции, ученики запоминают гораздо меньше — скажем, 40 процентов — поэтому очень полезно обсуждать проблемы и учить друг друга.

Немецкие педагоги считают, что не бывает талантливого ученика. Соответственно, они стремятся открыть неизведанные стороны личности ученика, воспитать его в духе новаторства и изобретательства. Педагоги в первую очередь стремятся добиться независимого мнения ученика, даже если оно ошибочно. А образовательный процесс опирается на гармоничное сотрудничество родителей и учителей.

Обучение учащихся младших классов написанию самостоятельной задачи в настоящее время привлекает внимание учителей и воспитателей как один из важных вопросов. При этом, научив учащихся создавать несколько обратных задач к задаче, рекомендованной в учебнике, у них будет обеспечено глубокое усвоение программного материала и формирование представлений о связи математики с жизненными событиями, умение самостоятельное мышление будет развито. Наблюдения и эксперименты показывают, что большинство учащихся начальной школы (даже учащиеся 5-6 классов не являются исключением) испытывают затруднения при решении задач. Наш взгляд, основной причиной этого является отсутствие системы заданий для постановки задач, а также недостаточная разработанность методики выполнения таких упражнений с теоретической и практической точки зрения.

Чем более независимо мышление человека, тем он более инициативен. Чем свободнее мышление ученика, тем более любознательным и творческим он будет. Именно поэтому в нашей стране уделяется особое внимание воспитанию всесторонне развитого поколения, состоящего из независимых, творчески мыслящих личностей.

Задания по созданию задачи и изменению ее состояния редко включаются в учебники начальной математики. Необходимо учитывать требования к созданию задачи и изменению ее условий, требования ГОСО и программы, требование учета индивидуальных особенностей обучающихся при коллективной работе, требования к размещению задач в системе. Мы считаем целесообразным составить несколько обратных задач к задаче, рекомендованной в учебнике математики, и дать задания на изменение ее состояния в следующей последовательности:

- Учащийся имеет в виду создать задачу с «сюжетом» по предметам и противоположную ему задачу. В этот период, поскольку игровая активность ученика усиливается, учитель при составлении текста задачи может выбирать разные темы.

- Задача создания задачи по картинке представлена задачей создания задачи с использованием изображений отдельного предмета (например, яблока, груши, граната, гриба, лисы, петуха и т. д.).

- Своевременное обсуждение каждой проблемы, созданной учащимися, исправление ее, если проблема создана неправильно, и поощрение их, во многом поможет учащимся развить навык самостоятельного решения задач.

- Составление студентами вопросов добровольного содержания без ограничения какими-либо условиями.

- Составление заданного количества данных и практических задач, которые необходимо решить на их основе.

Ниже мы рекомендуем практическую работу по созданию задачи и ее решению обратным задачам, рекомендованным в учебнике математики для 3 класса, рекомендованном к изданию в 2023 году издательством «Novda Edutainment».

Задача 8 на стр. 24 учебника математики для 3 класса и ее решение:

ВОПРОС: Вторая башня ташкентских курантов была построена через 62 года после первой. Прошло 75 лет с момента постройки старой башни. Сколько лет прошло с момента постройки новой башни?

ДАнный:

Прошло 75 лет с момента постройки старой башни;

Новая башня была построена 62 года спустя; К новой башне - ? Прошел год.

РЕШЕНИЕ: $2023-75=1948$ (Год постройки Старой Башни).

$1948+62=2010$ (год постройки новой башни);

$2023-2010=13$ (последний год с момента постройки новой башни);

ОТВЕТ: 13 лет.

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Обратные задачи и их решение этой задачи.

ОБРАТНЫЕ ПРОБЛЕМЫ:

1) Вторая башня ташкентских курантов была построена через 62 года после первой. Если старая башня была построена в 1948 году, сколько лет прошло с момента постройки новой башни?

ДАННЫЙ:

Старая башня была построена в 1948 году.

Вторая башня была построена 62 года спустя.

Была построена новая башня - ? Прошел год.

РЕШЕНИЕ: $1948+62=2010$ (год постройки новой башни).

$2023-2010=13$ (последний год с момента постройки новой башни).

ОТВЕТ: 13 лет.

2) Вторая башня ташкентских курантов была построена 13 лет назад. Если этот минарет был построен через 62 года после первого, то когда был построен первый минарет и сколько лет ему прошло?

ДАННЫЙ:

Вторая башня была построена 13 лет назад;

Эта башня была построена через 62 года после первой;

Первая башня -? встроены.

РЕШЕНИЕ: $2023-13=2010$ (Год постройки второй башни).

$2010-62=1948$ (год постройки первой башни).

$2023-1948=75$ (построен 75 лет назад).

ОТВЕТ: 1948 года, построен 75 лет назад.

3) Вторая башня Ташкентского куранта построена в 2010 году, а первая построена за 62 года до этого, в каком году была построена эта башня?

ДАННЫЙ:

Первая башня была построена в 2010 году;

Вторая башня была построена 62 года назад;

Вторая башня - ? встроены.

РЕШЕНИЕ: $2010-62=1948$.

ОТВЕТ: Вторая башня была построена в 1948 году.

ДОПОЛНИТЕЛЬНЫЙ ВОПРОС:

Вторая башня ташкентских курантов была построена через 62 года после первой. Прошло 75 лет с момента постройки старой башни. Когда была построена новая башня и сколько лет ей исполнилось?

ДАННЫЙ:

Вторая башня построена через 62 года после первой;

Прошло 75 лет с момента постройки старой башни;

Новая башня - ? встроены.

Был построен новый минарет - ? Прошел год.

РЕШЕНИЕ: $2023-75=1948$ (год постройки старой башни);

$1948+62=2010$ (год постройки новой башни);

$2023-2010=13$ (последний год с момента постройки новой башни).

ОТВЕТ: Он был построен в 2010 году, 13 лет назад.

Заключение.

Если подготовлены дополнительные задачи (обратная задача, задача с дополнительными вопросами) с решениями всех задач, приведенных в учебниках, и если эти задачи рекомендованы учащимся для отработки на каникулах или в выходные дни, это поможет повторить изученное и улучшить математические знания. При реализации этой системы важным фактором достижения положительных результатов служит постоянный контроль со стороны родителей или лиц, ответственных за воспитание учащихся в семье.

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Article



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NART SOSLAN AND THE ANCIENT GREEK DAEDALUS: A TYPOLOGICAL ANALYSIS

Abstract: The article examines typologically similar plots with the motive of the hero's flight using artificial wings made of bird feathers. Myths about the nart Soslan and the ancient Greek hero Daedalus go back to one archetype. The creation of wings by Soslan and Daedalus and their safe landing reflects the motive of initiations.

Key words: Narts epic, ancient Greek myth, Exiled, Daedalus, eagle, archetype.

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НАРТ СОСЛАН И ДРЕВНЕГРЕЧЕСКИЙ ДЕДАЛ: ТИПОЛОГИЧЕСКИЙ АНАЛИЗ

Аннотация: В статье рассматриваются типологически сходные сюжеты с мотивом бегства героя с помощью искусственных крыльев из перьев птицы. К одному архетипу восходят мифы про нарта Сослана и древнегреческого героя Дедала. Создание крыльев Сосланом и Дедалом и их благополучное приземление отражает мотив инициаций.

Ключевые слова: нартовский эпос, древнегреческий миф, Сослан, Дедал, орел, архетип.

Введение

Нартовский эпос бытует у многих народов Кавказа: осетин, абхазцев, кабардинцев, балкарцев, карачаевцев, адыгейцев, черкесов, ингушей. В нартовском эпосе отразились космогонические, этиологические, эсхатологические, тотемические, героические мифы всех этих народов. Образ нартовского героя Сослана встречается во всех национальных версиях: Сосрукъ – у балкарцев, Сосурукъ – у карачаевцев, Саусэрыкъуэ – у адыгов и абазин, Сеска Солса – у чеченцев и ингушей, Сасырыкъуа – у абхазов.

На сходные черты образа Сослана в национальных версиях указывали исследователи-нартоведы: Е.М. Мелетинский [9, с. 165-187], В.И.Абаев [4, с. 171-182], Ж. Дюмезиль [8, с. 72-94], И.В.Тресков [15], З.Д. Джапуа [7, с. 246-266],

Ю.С.Гаглойти [5, с. 5-37], Ф.М. Таказов [12], З.К. Ханаева [16, с. 229–244], и др.

Нарт Сослан выступает и как культурный герой, и как вождь, предводитель нартов в походах, и как герой, спасающий нартов от врагов или от голода, и как солнечный герой. По богатству мотивов, связанных с его образом, Сослан опережает остальных героев.

Основная часть

В нартовском эпосе осетин есть сюжет, сближающий миф о Сослане с древнегреческим мифом о Дедале.

Дедал в греческой мифологии выступает как изобретатель столярных инструментов и искусным архитектором, что сближает его с Сосланом как культурным героем. На Крите Дедал создал для Минотавра лабиринт и,

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впоследствии показал Ариадне способ, каким образом Тесей может из него выбраться [6, с. 228].

Узнав о роли Дедала в бегстве Тесея, царь Минос заключил его вместе с сыном Икаром в лабиринт. Сделав крылья, склеив их воском, Дедал вместе с сыном Икаром улетел с острова. Крылья Икара, поднявшегося слишком высоко, под лучами солнца разогрелись и рассыпались. Икар упал в море и погиб. Дедал же благополучно долетел до сицилийского города Камик [14, с. 363].

С помощью крыльев спасается и нарц Сослан.

Сослан, охотясь вместе с Созырько и Урузмагом, убил черную лисицу. Между ними разгорелся спор. Каждый из них хотел обладать шкурой убитой черной лисицы. В итоге решили: каждый из них расскажет наиболее интересный эпизод из своей жизни и кто победит, тому и останется шкура черной лисы.

Когда очередь рассказывать дошла до Сослана, он поведал, как однажды убил на охоте тура. Когда он хотел его освежевать, на него налетел орел и поднял в воздух. После долгого полета орел опустил его на небольшой пяточек земли возле пещеры, находившейся на высокой скале, откуда не было спуска. Орел снова улетел и через некоторое время принес тура, убитого Сосланом.

Сослан приготовился к прилету орла, и когда он опустился с тушей тура возле пещеры, то Сослан выстрелил в него и убил. Он освежевал тушу тура, приготовил себе шашлык, затем стал думать, как ему спуститься на землю.

Вокруг лежало много добра. Сослан среди всего этого добра моток шнура. Отрезав у орла крылья, он заново связал их таким образом, что получились новые крылья. Сбросив все добро вместе с тушей тура на землю, привязал к своим рукам крылья орла и слетел с высокой скалы.

В итоге шкуру черной лисицы присудили Сослану за смелость и находчивость [11, с. 423-433].

Подобный сюжет есть и в осетинских сказках. Так, в сюжет «Сказка о балкарском и кабардинском охотниках» повествуется, как два охотника, выстрелив одновременно в оленя, стали спорить, кому должна принадлежать голова оленя. По обычаю голова зверя, как самая почетная часть, принадлежит убившему. А так как оба выстрела были смертельными и были произведены одновременно, договорились, что голова достанется тому, кто расскажет из своей жизни более чудесное и опасное приключение.

Балкарец поведал о том, как однажды, когда он возвращался домой с убитой дичиной на спине, его схвати орел и принес на вершину неприступной скалы. Орел съел дичину, а утром улетел и принес новую дичину. В отсутствие орла

балкарец осмотрел логовище и заметил много оружия и человеческих костей. По возвращению орла балкарец убил его. Долго не мог найти способ спуститься со скалы. Затем он подвинул орла к краю скалы, распялил ему крылья, нагрузил на орла лучшее оружие, сел ему на спину, оттолкнулся от края пропасти и благополучно спустился на землю [10, с. 335-336].

У индейского народа микмаков, проживающих в атлантических провинциях Канады, бытует сказка об орле, который уносил людей в гнездо на корм птенцам. Один охотник решает убить его. Он прячет под одеждой лук и, когда орел его сбрасывает на камни, лук спружинивает. Пока орла не бывало, охотник кормил птенцов, и они упросили родителя не убивать его. Когда птенцы подросли, охотник убил одного из них, нацепил его крылья на себя и спустился на землю [3, с. 31-42].

В мифах индейского народа чоль, живущих в мексиканском штате Чьяпас, бытует похожий сюжет. Орел уносит людей на корм птенцам. Герой опутывает себе грудь веревкой. Орел приносит его к птенцам. Герой убивает птенцов, отрезает им крылья и спускается на землю [2, с. 29-30].

В тунисской сказке Бог прикрепил свинье крылья по ее просьбе, скрепив их воском. Однако свинья, подобно Икару, взлетела повыше, и воск растаял на солнце. Свинья упала на землю носом, отчего у нее нос пяточком [1, с. 109].

Сюжеты с неудачным использованием крыльев птиц для полетов бытуют у многих народов, однако они несут другую семантическую нагрузку, поэтому мы не будем их рассматривать.

Какова же семантика мотива использования крыльев птиц, чтоб спасти свою жизнь?

Чтобы понять смысл мотива полета героя, необходимо рассмотреть архетип орла, являющийся одним из центральных образов в реализации конечной цели установки сюжета.

В мифологии осетин орел неразрывно связан с троичной системой религиозно-мифологической картиной мира. Орел маркирует Ось мира, выступая зооморфным образом Бога. Подобно Богу Орел обладает способностью проникать во все три мира: верхний, средний и нижний. При этом Орел символизирует верхний мир [13, с. 183].

В сюжете «Сослан в царстве мертвых» рассказывается о проникновении Сослана в царство мертвых, и о его возвращении в царство живых людей. Вернуться на землю Сослану помогает Орел, чьих птенцов он спас от змея [11, с. 514-529].

И когда Сослана орел уносит на вершину недоступной скалы, то это демонстрирует нам об инициационном пути, который должен проделать герой.

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Если вспомним, что рассказу Сослана об орле предшествовал спор трех товарищей за обладание шкурой черной лисицы, то мы обнаружим все признаки инициационного мифа.

Когда Сослан отправился на охоту со своими товарищами Созырыко и Урузмагом, дорогу им перерезала ведунья с пустыми ведрами. Сослан рассвирепел и разбил ее ведра, из-за чего ведунья прокляла их.

Поведение Сослана становится понятным в контексте верований осетин, согласно которым женщина (тем более ведунья) символизирует нижний мир, мужчина – верхний мир. Потому ей нельзя было пересекать дорогу мужчины, так как она, при этом, вносит хаос на их пути.

В контексте же данного сюжета проклятие ведуньи героя, отправляющегося по пути иницианта, отражает символическую смерть последнего [11, с. 423].

Рассказ Урузмага не менее удивителен, чем рассказ Сослана: Урузмаг, желая выпить воды на берегу моря, наклонившись, оказался в чреве кита. Разрезав чрев кита кинжалом, он выбрался наружу [11, с. 429].

Удивителен и рассказ их третьего товарища Созырыко.

По рассказу Созырыко, он пошел на охоту с молодым парнем. Убил зайца, положил его тушу

рядом, а сам прилег отдохнуть. Когда проснулся, обнаружил, что пропала туша зайца. Парень ответил, что он повесил тушу на этот куст, и заяц сбежал. Я разозлился и убил его. Но потом пожалел о своем поступке. Подумав, решил положить мертвое тело моего товарища на тот куст и он ожил. Затем дал ему ружье и попросил его выстрелить в меня. Я оказался в царстве мертвых. Там встретил красавицу Агунду. Когда мой товарищ положил мое тело, чтоб оживить меня, я с собой захватил и Агунду, с которой затем справил свадьбу [11, с. 430-432].

Почему же победил Сослан? Урузмаг и Созырыко покорили только нижний мир. Инициационный же путь Сослана завершился покорением верхнего мира, потому и награда досталась ему.

Таким образом, типологическое сходство полета Сослана и Дедала с помощью созданных ими крыльев имеет один и тот же архетип. Покорение неба равнозначно покорению верхнего мира, благодаря чему Сослану достается шкура черной лисицы, символизирующего фарн (богатство и духовное, и материальное). Дедал же становится легендарным архитектором, изобретателем инструментов и мастерства.

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Article



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THE MAIN DIRECTIONS OF THE STATE POLICY OF UZBEKISTAN AND THE CONTEXT OF THE HIGH POSITION OF THE PARTY AND THE INTERNATIONAL RATING AND INDEX

Abstract: In this article, the author studied that Uzbekistan, nestled in the heart of Central Asia, has historically been a melting pot of cultures and civilizations, thanks to its pivotal role in the Silk Road. Its rich tapestry of history reflects a blend of empires, nomads, and diverse cultures that have left their mark over millennia. However, in the contemporary era, despite its strategic location and potential, Uzbekistan often remained in the periphery of global dialogues and didn't fully realize its potential on the international stage.

Key words: international rating, index, state policy, state position, management, management methods, economic efficiency, individual characteristics, motivation, evaluation.

Language: English

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Introduction

Uzbekistan, nestled in the heart of Central Asia, has historically been a melting pot of cultures and civilizations, thanks to its pivotal role in the Silk Road. Its rich tapestry of history reflects a blend of empires, nomads, and diverse cultures that have left their mark over millennia.

However, in the contemporary era, despite its strategic location and potential, Uzbekistan often remained in the periphery of global dialogues and didn't fully realize its potential on the international stage. Yet, a transformative shift has been observed recently.

The past decade, in particular, has been momentous for the nation, witnessing a remarkable climb in a plethora of international rankings. These rankings, spanning from economic indicators to social parameters, not only highlight the nation's progress but also underscore its burgeoning role in the global arena.

URGENCY

In this regard, it is important to implement an effective decision-making system based on openness

in public administration. It is necessary to review the principles and mechanisms of mutual cooperation between the state management and executive bodies, each state body must ensure the implementation of state policy in the area assigned to it and be fully responsible for the final result. Such a democratic method of state management is very compatible and harmonious with the large-scale reforms carried out in Uzbekistan today, first of all, the principle of dialogue with the people.

RESEARCH METHODOLOGY

Uzbekistan has improved its position in the public administration quality index compiled by the World Bank. The index includes accountability, political stability, government efficiency, corruption control and other indicators.

The experts of the World Bank announced the updated indicators of public administration (World Governance Indicators, WGI) for 2021. The country is reported to have improved in all six areas after a negative performance in 2020.

The WGI index is divided into such parts as "reporting", "political stability and absence of

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violence”, “government efficiency”, “quality of regulatory and legal documents”, “rule of law and anti-corruption control”. The World Bank does not independently rank countries according to this index.

THEORETICAL APPROCHES

The Regulatory Quality Index assesses a government's ability to "design and implement effective regulation that supports private sector development." The indicator takes into account many indicators from different sources, in particular, the organization of the market and competition (from the political change index calculated by the Bertelsmann Foundation in Berlin), the level of unfair competition, price controls, discriminatory tariffs and taxes, excessive protectionism (estimated by the Economist Intelligence Unit in London), inconsistencies in the tax system and regulatory burden (according to Global Insight), investment and financial freedom (according to the Heritage Foundation Index of Economic Freedom in the United States), law enforcement practices (according to The World Justice Project), etc.

In the preparation of the index, other calculations are taken into account, in particular, the World Bank, the European Bank for Reconstruction and Development and the World Economic Forum. All this information is aggregated and the regulation indicator itself can range from -2.5 (worst) to 2.5 (best). Neutral level is 0.

ANALYTICAL PART

Management is total in the formation of quality indicators 30 information sources are used. Unlike last year, 16 sources of information were used to calculate the indicators of Uzbekistan. According to "Government efficiency", Uzbekistan is among 208 countries Ranked 116th, rose 22 places.

The effectiveness of government is greatly influenced by the quality of public services, the degree to which the public office operates and its independence from political pressure, the quality of policy development and implementation, and the credibility of the government's commitment to such policies.

The indicator of the position of Uzbekistan in comparison with other countries is 44.7 percent, that is, in 44.7 percent of countries, the level of public administration efficiency is worse than in Uzbekistan. A year ago, this figure was 34.1%.

Therefore, embarks on a journey to delve deeper into the nuances, mechanisms, and strategies that have steered Uzbekistan towards this commendable ascent, shedding light on the key aspects that have been instrumental in repositioning it on the global map.

Extensive reviews of databases and published reports from globally recognized institutions, such as the World Bank, the United Nations, the World Economic Forum, and regional bodies like the

Shanghai Cooperation Organization, were undertaken. Special emphasis was placed on annual reports, policy reviews, and specific country analysis documents that detailed Uzbekistan's performance metrics over the past decade.

A series of surveys were distributed to business leaders, both domestic and international, operating in Uzbekistan. These surveys aimed to gather perceptions on the nation's business environment, reforms, and the overall ease of operations.

Trend analysis was employed to map out Uzbekistan's progression in numerical terms. Data visualization tools, such as graphs and charts, were used to highlight significant inflection points and shifts in rankings. Statistical tests, where applicable, were used to determine the significance of observed changes.

Content analysis was conducted on textual data sourced from reports, interview transcripts, and survey responses. This allowed for the identification of recurring themes, sentiments, and narratives that could shed light on the qualitative aspects of Uzbekistan's growth. Particular attention was given to policy descriptions, reform initiatives, and strategic partnerships to decipher their impact on the country's international standing.

To position Uzbekistan's growth in a broader context, its trajectory was juxtaposed against select neighboring countries and global averages. This comparison offered a perspective on the nation's performance relative to its peers and the global landscape.

Uzbekistan introduced a series of economic reforms that bolstered foreign direct investment, leading to higher GDP growth rates and an improved ranking in the ease of doing business.

Efforts to lessen the dependence on traditional sectors, like cotton, have seen a rise in areas such as tourism, technology, and manufacturing.

The restructuring of the education system, emphasizing technological integration and vocational training, has enhanced its human capital index.

Reports indicate a marked improvement in the areas of freedom of expression, assembly, and the press.

Uzbekistan's commitments to sustainable practices and renewable energy sources have positively influenced its ranking in global environmental indices.

The multifaceted approach adopted by Uzbekistan provides valuable insights into nation-building in the 21st century. The nation's economic pivot, transitioning from an insular model to one inviting international collaboration, has been instrumental in its upward trajectory. By focusing on sectors beyond its traditional strengths, Uzbekistan has showcased adaptability.

Education emerges as another cornerstone. By recognizing the demands of a modern economy,

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Uzbekistan's focus on integrating technology into curricula and emphasizing vocational training demonstrates forward-thinking.

CONCLUSION

The enhancements in civil liberties indicate not just a response to international pressure but possibly a more intrinsic societal evolution, reflecting a broader global trend towards transparency and freedom.

Lastly, Uzbekistan's environmental initiatives are particularly commendable. In an era where climate change impacts are undeniable, the nation's commitment to sustainable practices offers hope and serves as a model for others.

Uzbekistan's trajectory in international rankings is a testament to its adaptive reforms and strategic initiatives. As the country continues on this path, it solidifies its place not just in rankings but in global relevance and influence.

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ANALYSIS OF INVESTMENT POSSIBILITIES OF INTERMODAL TRANSPORTATION AND TERMINAL IN GEORGIA

Abstract: The article presents the presentation of the model of new service, intermodal, contrarail shipments in the railway transport system of Georgia. Determination of its value in the railway system of Georgia. The current condition of railway stations and terminals is discussed in the study. Modern technologies of counter-rail transportation for the railway sector of Georgia have been evaluated. The article identifies investment opportunities: through the reconstruction of existing stations and terminals and the construction of a new terminal. Economic analysis makes it possible to make informed and conscious decisions when launching a new sustainable mode of transport. The obstacles considered in the research can become a hindrance in the implementation of contrarail shipments. Such as tunnels, the strength of curves and tracks, volume.

The study takes into account international standards, including the "International Agreement on Rail Freight Traffic" and "Technical Conditions for Cargo Placement and Fastening". The research helps launch sustainable shipping.

Key words: Intermodal shipments, type of ized shipment, railway.

Language: English

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Introduction

The main task of the railway transport of Georgia was to fully and timely satisfy the needs of the country's economy and population in transportation. The current state of the market and national economy, which is characterized by an imbalance in the financial system, with a decrease in production and investment in basic industries, together with the previous goal, requires the provision of transportation services and a fundamentally new, competitive transportation service to customers. Over the last decades, the share of intermodal shipments in the transport system of Georgia has increased significantly. Be it, sea, vehicle or truck types of transportation.

It is important for the economy of Georgia to develop the transportation of counter-trailers as a green, ecological type of transport, since the mentioned model will allow the transport market to more fully adapt to the new global system of supplying goods and services. Multimodal transport has the ability to flexibly respond to changes in market conditions.

In general, just like any activity, transport activities related to innovation and its implementation necessarily require improvement of organizational mechanisms and capital investment, for this, it is necessary to make a comprehensive economic assessment, to develop special approaches, especially if the market conditions are highly competitive.

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Main part

Con trailer transportation is a type of intermodal transportation where a loaded trailer or trailer/body (empty or loaded) is placed in a specially equipped station by means of a transfer platform on railway tracks, where it continues its way through the railway to the destination station, and the further journey is completed by land vehicle. Both qualitative and quantitative methods of technology have been used to assess the feasibility of such shipments. For this purpose, we identified 3 main tested criteria: technical, technological and economic.

In the technical criteria, we discussed the technical parameters of the load units of the rolling stock and selected a vehicle with acceptable parameters for the rolling stock of the Georgian Railway train.

The technological criteria include the parameters of the horizontal load terminal processing equipment for 4 models (Modulohr, Cargobeamer, Megaswing, Cargospeed) and the economic criteria determine the average investment equipment cost for the selected stations and terminals.

Qualitative methods are used:

Literary works, information and reports, analysis describing the transport market of the region.

Due to its geographical location, Georgia is in a complex terrain transport system, among which railway transport is no exception, and therefore, when transporting large cargoes, we take into account the capacity and volumes of tunnels, curves and tracks. Cargo size is a particularly sensitive issue for con trailerized shipments. The "International Agreement on Railway Freight Traffic" (SMGS) was developed by the Railway Cooperation Organization OSJD, including for countries that must meet zonal requirements in terms of gauges. That's why the "Technical Conditions for Cargo Placement and Fixing" have been developed, according to which the 12th chapter of the first volume is devoted to the loading conditions of con trailer truck shipments and it is established that for con trailer shipments, it is necessary to take into account 2 important parameters, the height and width of the loaded cargo, the maximum data of which is height 5.3 m, and the width - 3.4 m [1].

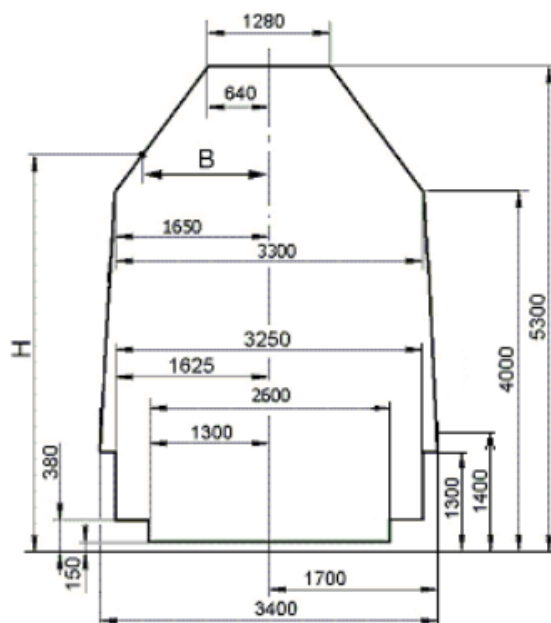


Fig. 1. Cross-section of train

To calculate the area of each module for research, we also need the parameters of the semi-trailers themselves, which means the length and width of the semi-trailers, and we also take into account the weight of the load to determine the number of components and the height depending on the requirements of the complex terrain (tunnels, bridges, curves). The data of the wagons also differ according to the models, so we take the maximum lengths of the

mentioned wagons, taking into account the length of the semi-trailers. for example; The maximum weight of the trailer for the Modulohr module is 13.7 m; For Cargobeamer - 14.2 m; 16.3 m for Cargospeed and 14.7 m for Megaswing. As for the height, the height of the semi-trailers starts from 2.3 m and the maximum is 4 meters, although in the main form there are trailers with a height of 2.7 m. Which requires the presence of appropriate drawings on the road of

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Georgia due to the difficult terrain to determine the dimensions of the cargo [2,3,4].

The given table discusses the maximum capacities of the trailer trailer and the train according to the length and weight of the train:

Table 1.
System-specific options for weight and length

	Modalohr	Megaswing	CargoBeamer	Cargospeed
module width	57	20	21.4	60
Maximum length of car trailer	13.7	10.2	14.2	16.3
Maximum trailer weight (t)	38	48	47	38.5
Wagon Tare (t)	40.7	28.1	31	24
Wagon tare on 1 trailer (t/Lu)t	20.35	14.05	31	24
The length of the carriage	32.94	21.50	19.3	18.2

Based on the parameters of individual stations, the number of carriages in the train was calculated.

Table 2.
Number of carriages on the train

Depending on the length of the loading dock

	Batumi	Poti	Tbilisi	Rusravi	Anaklia
The length of the loading front	190	420	390	610	750
Modalohr	5	12	11	18	22
Megaswing	8	19	18	28	22
CargoBeamer	9	21	20	31	38
Cargospeed	10	23	21	33	41

According to individual parameters, the number of car trailers at stations according to the maximum length of one train composition, which is given in the form of a table.

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Table 3.
Number of car trailers by length (m)

	Batumi	Poti	Tbilisi	Rusravi	Anaklia
Modalohr	10	24	21	36	44
Megaswing	16	38	36	56	42
CargoBeamer	9	21	20	31	38
Cargospeed	20	46	42	66	41

The area required for each module of the loading-unloading operation was calculated by multiplying the length and width of the module composition in m^2 .

Table 4.
The required area for the module according to the stations

	Batumi	Poti	Tbilisi	Rusravi	Anaklia
Modalohr	1083.0	997.5	1058.6	965.8	971.6
Megaswing	237.5	221.1	216.7	217.9	357.1
CargoBeamer	452	428	417	421	422
Cargospeed	570	548	557	555	1098

The area required for the module according to the stations, the possibility of performing parallel operations according to the modules, which requires the presence of several similar technologies at the terminal and their number, when the wagon is loaded with this technology, should be taken into account. Besides Megaswing, other modules require the presence of a special similar technology terminal at the point of destination, and Megaswing with its independent system does not require the presence of an automated system at the receiving point. Therefore,

other than Megaswing, the terminal arrangement model needs at least 2 terminal systems to function [5].

The investment costs of the considered technical options are studied from the literature and calculated in $EURxm^2$. The costs are calculated for the creation of the manipulation zone and according to the modules.

Table 5.
Technology investment costs in stations:

	Batumi	Poti	Tbilisi	Rusravi	Anaklia
Modalohr	2,610,030	5,769,540	5,357,430	8,379,570	10,302,750
Megaswing	915,800	2,024,400	1,879,800	2,940,200	3,615,000
CargoBeamer	4,125,000	9,625,000	9,166,667	14,208,333	17,416,667
Cargospeed	2,747,400	6,073,200	5,639,400	8,820,600	10,845,000

It should be noted that there are risks associated with the cash flow forecast, so we make a 15-year forecast, taking into account the operational period of

the new equipment. Among the above-mentioned horizontal loading technologies, the Megaswing module receives the most value for the Poti and Ankli

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stations, since it contrails less capital costs, and does not require the reconstruction of the stations. It has parametric indicators that meet the technical manufacturing difficulties and as a result of the calculation has the highest current monetary value compared to other technologies.

We use the weighted average cost of capital (WACC) to calculate today's cash flows [6].

To calculate the WACC, we consider the following factors:

1. Cost of capital (KE) in dollars at 14.16% by the formula:

$$R_f + \beta_{lev} * EMRP + CRP + SRP \quad (1)$$

where R_f is the risk-free rate;

β_{lev} is beta and defines industry-specific risk;

EMRP- is market risk;

CRP- is country risk;

SRP- is additional size risk;

2. The cost of the loan in the form of monetary obligations $K_d(at)$ 5.78% with the formula:

$$K_d(pt) * (1 - T) \quad (2)$$

where $K_d(pt)$ is the value of borrowed capital for the day of analysis, taking into account railway bonds;

T-Income tax rate, according to the Tax Code.

To calculate the WACC of the weighted cost itself as 12.43%, we use the following formula:

$$K_e * W_e + K_d(at) * W_d \quad (3)$$

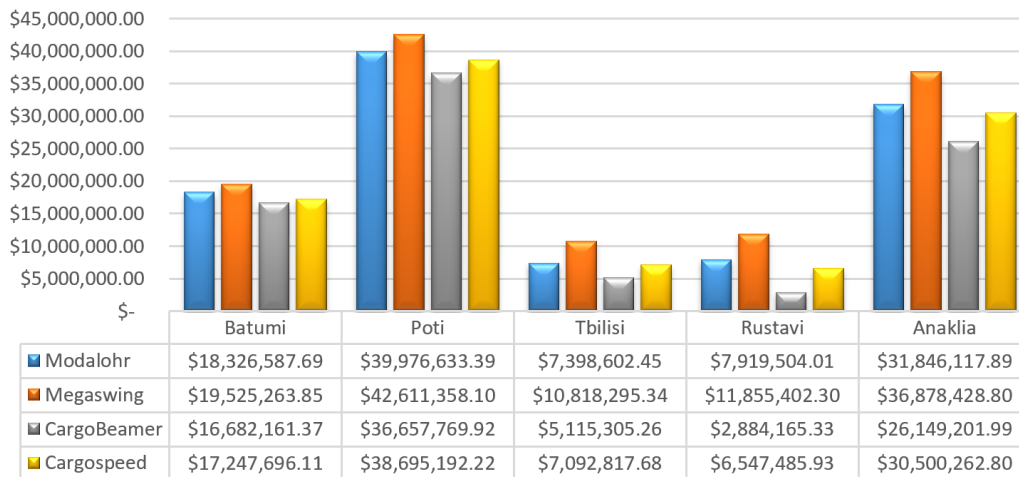
where K_e is the cost of capital;

W_e - is the equity share;

$K_d(at)$ – is the cost of borrowed capital;

W_d - loan share.

Present value



Current value of the terminal module

Fig. 2.

CONCLUSION

In modern conditions, when transportation has to undergo significant changes with the transition to green technologies, thereby reducing 90% of greenhouse gases, a sustainable and intelligent mobility is required, which requires conclusions based on facts and research, which may be associated with high investments to counterbalance its social importance.

Taking into account the international standards and the parameters of the stations, the areas of the manipulation modules of the contrarail shipments and their investment value were calculated.

Our goal was to describe, compare and evaluate the presented modern technologies based on the operational and technological analysis for the implementation of counter-trailer transportation in terms of space and investment costs of the transportation facility. Each implemented technology

is a unique complex with its own advantages and disadvantages, such as scale, flexibility, processing time and costs. The study highlighted 2 investment opportunities, when the development of terminal operations is possible by completing the infrastructure of existing terminals, i.e. reconstruction, and the second option, when the construction of a new terminal is required, for example, in case of a potential breakdown.

As a result of the study, it was revealed that the Kargobeamer and Megaswing systems are wagon-based technologies that require minor modifications to the terminal infrastructure for Batumi, Poti, Tbilisi Sakvandzo and Rustvai stations, while the Anaklia station requires construction.

On the basis of the economic analysis, we concluded that the cost of the mentioned project for Poti and Anakli with a horizontal load module for Megaswing is valuable and gives the basis for

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equipping the terminals for the mentioned stations to carry out counter-trailer shipments.

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THE PERSPECTIVES OF USING VIRTUAL REALITY TECHNOLOGIES IN COMPUTER CLASSROOMS

Abstract: The paper discusses why virtual reality (VR) technologies should be used in the computer classroom, and considered advantages and examples of VR technologies. In addition, the process of using these technologies in computer classes and its prospects are considered. The relevance of their use in teaching students is substantiated.

Key words: computer classes, innovation, educational process, virtual reality, information literacy, ICT.

Language: English

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Introduction

Nowadays, the implementation of innovative technologies into the educational process, including virtual and augmented reality technologies, is used not only in computer classes, but also in other educational areas. However, almost all of these technologies are used first in the computer labs. In general, it is no secret that whether it is virtual reality (VR) technology or other technologies, the possibilities for use in the computer classroom are relatively numerous. To be specific: firstly, computer classes have such advantages as the presence of not one computer, but several computers (for students), the presence of relatively good quality computers (which can run programs). Second, the advantage of subject teachers, that is, the computer literacy of computer science teachers, the ability to learn new technologies is high.

According to statistics, 90% of children by the age of 10 have their own smartphone and/or tablet [1, p. 107]. Every day new technologies are introduced into the daily life of students and become part of it. In addition, there is a digital transformation of education, which means a systematic update of the goals and

content of education, tools, methods and organizational forms of educational work in the developing digital environment. Now important requirements have become the development of information systems and the construction of a digital school model for the 21st century [2, pp. 137–147]. The authors of the next research consider the digital transformation of education an inevitable stage of school renewal [3, pp. 235-238].

Despite the expensive equipment and software, VR technologies have a number of obvious advantages over traditional teaching tools, so the prospects for their use are quite justified. The use of VR technologies in the education system is a promising area of development. Nevertheless, their use is associated not only with financial and organizational difficulties. It is also necessary to take into account that, in addition to the technical features of organizing space, the programs themselves must comply with certain ethical and conceptual standards of education and be adapted to the capabilities and needs of different groups of students. That is, VR technologies must be in context, that is, they must fit

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the environment of use, the capabilities of teachers and, most importantly, the characteristics of the student group (age, level of preparation). And also VR technologies in education should, first of all, be user-friendly from all points of view - from the size of the helmet and the correct positioning of students for the best viewing angle to the simplicity and convenience of the interface and the absence of side effects (such as motion sickness during virtual movement).

Virtual and augmented reality technology is a technology that can significantly enrich the educational process by visualizing and completing the necessary elements, acting as a constructor and material for creativity and manifestation of creativity. Such technologies make it possible to make the learning process visual, interactive, and interesting, thereby increasing student motivation and engagement, thereby having a positive impact on academic results. The studies also note the benefits that the VR environment is programmable, which makes it flexible and allows you to plastically change the parameters of virtual objects and the events occurring with them. It is possible to present a wide variety of stimuli (both stationary and moving) with controlled parameters (brightness, color, shape, etc.). [4, pp. 64-71]

Main part

In the classical educational process in computer classes, students receive ready-made generalized knowledge from textbooks and then do assignments on computers. Although computer classes already use new technologies such as projectors and various digital platforms, virtual technologies can provide new knowledge from a different angle. First of all, the advantage of VR technologies in general is the ability to display inaccessible objects. Here, it is a great advantage not only to see these objects in simple 3D format, but also to be able to move them and see them in detail with the help of hands (joysticks). As an example, in computer science lessons, students become familiar with many new technologies, although it is not possible in many schools to present them all in real life. In such cases, children can visually see what they are, not only with a video, but also get acquainted with the mechanics of their work and try it out for themselves. VR glasses or other types of head-mounted displays (HMDs), frequently used with headsets, can easily create the realistic feeling of being in a simulated world. To be fully immersed in a virtual world, our five senses must be activated. However, most current VR environments do not really take them all into account and tend to focus on two: vision and hearing [5, pp. 133-141].

An early way to connect VR and computer science education was Alice, which was designed as a rapid prototyping environment to create virtual environments using the Python programming language [6, pp.8-11]. Based on the next research [7,

p.214] contents range from initial course levels, such as teaching Algorithms and Introduction to Computer Science, to more advanced levels such as OpenGL Programming, Search Algorithms, Artificial Intelligence and Network Security. Grigoriev, Rodionov, Kochetkova in their work gave an example of a lesson on the topic "Computer structure" with VR, also they suggest adding VR to sections such as "Computer Software", "Algorithmization and Programming", "Computer Hardware" [8, pp.43-56]. The connection between virtual reality and computer science education is a promising approach for fostering programming skills. It has to be noted that, as the programs are developed outside the VR, the technology is not used as an instructional medium but rather as a device to evaluate the programming skills obtained outside the VR [9, p. 97]. Educational programs can usually be created on the same platforms on which computer games such as Unity are developed, using various tools for developing virtual and augmented reality programs (Google VR, Steam VR, Oculus, etc.).

Promising directions for continuing research are: studying the influence of a real VR environment on other cognitive processes and personal characteristics of a person; determination of time, age, gender restrictions on working with VR; use of the latest VR headsets in training; development of theoretical foundations and diagnostic procedures for studying various components of the influence of VR on students' thinking in the process of teaching certain school subjects.

Due to children's enthusiasm for virtual entertainment and the need for a large amount of information, learning material from traditional textbooks is becoming less and less effective every year. Immersion in VR will help them understand the material and approach learning in a creative and playful way.

The promise of this technology is evidenced by the fact that the global market for virtual and augmented reality headsets reached 11.2 million units in 2021, an increase of 92.1% compared to a year ago. Such data was published by IDC analysts (the international research and consulting company International Data Corporation) on March 21, 2022 [3, p. 236]

From a technical point of view, now there are all the prerequisites for the rapid development of this area of computer technology. The computing power of smartphones is steadily growing every year and is approaching that of a personal computer. This way the restrictions will become less strict and it will be possible to create more advanced virtual tutorials [10, pp. 96-98]

In the next paper, authors offer a course in "VR/AR development." for future computer science teachers. The section "Fundamentals of Virtual and Augmented Reality Technologies" examines the basic

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concepts and areas of application of technologies, students become familiar with such technical means as helmets and VR glasses, and analyze trends in the development of the AR/VR market. The second section of the course is devoted to the development of VR applications in the Varwin environment using the Blockly language. In addition, future computer science teachers develop a pedagogical lesson scenario. The third section of the course is devoted to the development of augmented reality applications for a computer science lesson. Discusses how schoolchildren should be taught how to develop augmented reality [11, pp. 193-196].

Conclusion

This article provides a systematic review of the literature aimed at studying the contribution of the use

of VR technologies in the learning process of computer science. As well, in this research the use of VR technologies in general education, including examples of their use in computer classes are discussed, and the advantages are highlighted.

There is no doubt that in the next few years, VR technologies will revolutionize human interaction with the real world, and their enormous potential will be used in a wide variety of fields, including computer science. Therefore, for the development and implementation of this unique new technology in the theory and practice of experimental computer science in educational institutions, systematic research is required regarding such important issues as methodology, ethical standards, and technical equipment.

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Article



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FOREIGN CURRENCIES AS AN OBJECT FOR INVESTMENT: COMPARATIVE ANALYSIS OF RETURNS ON INVESTMENT IN 2018- 2023 YEARS

Abstract: this article examines foreign currencies as a potential object for investing temporarily free money resources of the population in order to generate income, gives exchange rates for several foreign currencies at the beginning of January 2018-2023, and calculates the return on investment in foreign currencies for a period of one to five years.

Key words: investments, foreign currency, exchange rate, return on investment.

Language: Russian

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ИНОСТРАННЫЕ ВАЛЮТЫ КАК ОБЪЕКТ ДЛЯ ИНВЕСТИРОВАНИЯ: СРАВНИТЕЛЬНЫЙ АНАЛИЗ ДОХОДНОСТИ ИНВЕСТИЦИЙ В 2018-2023 ГОДАХ

Аннотация: в данной статье рассмотрены иностранные валюты как потенциальный объект для инвестирования временно свободных средств населения с целью получения дохода, даны обменные курсы нескольких иностранных валют на начало января 2018-2023 годов, рассчитана доходность инвестиций в иностранные валюты на срок от одного года до пяти лет.

Ключевые слова: инвестиции, иностранная валюта, обменный курс, доходность инвестиций.

Введение

В любом государстве население, которое можно представить как совокупность различных по составу, участникам, роду их деятельности, имущественному благосостоянию и ряду других признаков домашних хозяйств, является важным экономическим субъектом, обладающим многими ресурсами, активно участвующим в процессах как производства, так и потребления различных товаров, услуг или работ, формирующим различные фонды денежных средств, таких как семейный бюджет, личный бюджет, резервный и другие фонды денежных средств в результате разнообразных финансовых отношений со всеми сферами и звеньями финансовой системы государства. За счет использования денежных и других доходов, полученных из различных

источников, домашние хозяйства финансируют различные расходы, включая оплату налогов и других обязательных платежей, коммунальных услуг, приобретения продуктов питания, одежды, лекарств, канцелярских товаров. В случае, если у домашнего хозяйства образуются временно свободные денежные ресурсы, то оно может их использовать для инвестирования в различные финансовые инструменты с целью получения дохода. Одним из таких объектов для инвестирования выступают различные иностранные валюты, которые приобретаются населением как на краткосрочный, так и на долгосрочный период времени. Физические лица могут приобретать определенное количество иностранной валюты с целью последующего ее хранения дома, на картах Visa или MasterCard, а

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также получить дополнительный доход в виде процентов путем открытия банковского депозита, например, в долларах США в одном из коммерческих банков.

Проведем сравнительный анализ доходности от инвестиций в иностранные валюты, которые домашние хозяйства могли получить за счет изменения обменных курсов в период с 2018 по 2023 год. Главными источниками информации по

динамике обменных курсов в Республике Узбекистан является официальный сайт Центрального банка Республики Узбекистан (<https://cbu.uz/ru/>) (Рисунок 1), а также информация по динамике официального курса иностранных валют к суму Республики Узбекистан, представленная на информационно-правовом портале «Norma» (https://www.norma.uz/rate_dinamic).

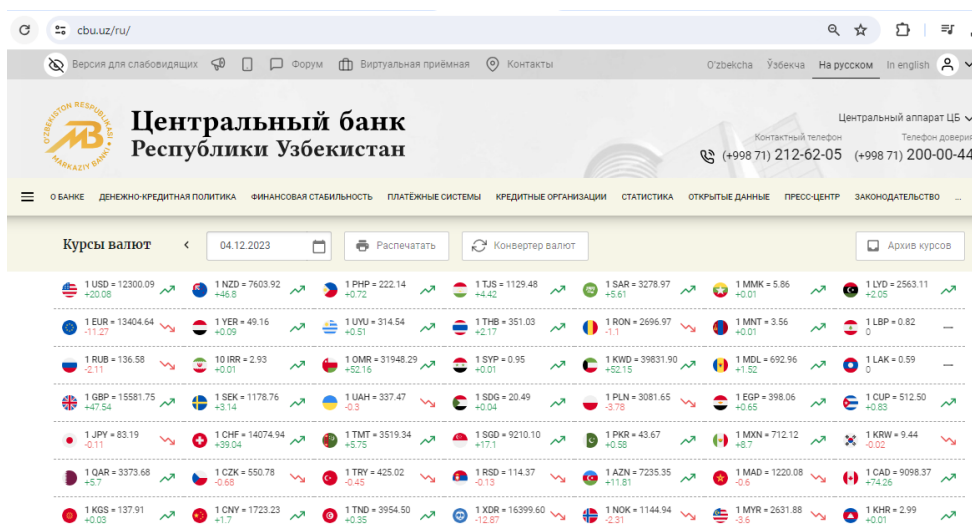


Рисунок 1. Пример представления обменных курсов иностранных валют к узбекскому суму на официальном сайте Центрального банка Республики Узбекистан (<https://cbu.uz/ru/>)

Из всего многообразия имеющихся иностранных валют выберем валюты 8 иностранных государств и представим обменные курсы данных валют к узбекскому суму по состоянию на начало января-месяца 2018-2023 годов в Таблице 1.

В качестве объектов для изучения были выбраны доллар США, евро, китайский юань, канадский доллар, швейцарский франк, австралийский доллар, российский рубль и японская иена.

Таблица 1. Обменные курсы иностранных валют к узбекскому суму*

(узбекские сумы)

Наименование валют	05.01.2018	01.01.2019	07.01.2020	05.01.2021	05.01.2022	04.01.2023
Доллар США	8136,67	8336,25	9507,89	10449,44	10819,67	11246,81
Евро	9775,40	9533,34	10608,90	12761,90	12228,39	11982,35
Китайский юань	1250,54	1212,46	1365,12	1601,45	1697,52	1621,86
Канадский доллар	6493,75	6112,96	7314,32	8208,52	8448,25	8300,84
Швейцарский франк	8321,41	8470,94	9776,75	11805,94	11787,42	12182,42
Австралийский доллар	6374,27	5869,55	6608,93	8039,8	7851,83	7636,58
Российский рубль	142,37	119,85	153,43	140,45	144,66	154,07
Японская иена	72,23	75,61	87,97	101,22	93,95	85,14

*Рассчитано на основе данных официального сайта Центрального банка Республики Узбекистан <https://cbu.uz/ru/>.

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Проанализируем доходность инвестиций в иностранные валюты с помощью использования следующей формулы:

$$D = (OK_2 / OK_1 - 1) \times 100,$$

где D – доходность инвестиций, выраженная в процентах;

OK₂ – обменный курс иностранной валюты

на конец периода инвестирования;

OK₁ – обменный курс иностранной валюты на начало периода инвестирования.

Прежде всего, рассчитаем доходность инвестиций в иностранные валюты сроком на один любой год в период времени с января 2018 года по январь 2023 года (Таблица 2).

Таблица 2. Доходность инвестиций в иностранные валюты на один год

(в процентах)

Наименование валют	2018-2019	2019-2020	2020-2021	2021-2022	2022-2023
Доллар США	2,45	14,05	9,90	3,54	3,95
Евро	-2,48	11,28	20,29	-4,18	-2,01
Китайский юань	-3,05	12,59	17,31	6,00	-4,46
Канадский доллар	-5,86	19,65	12,23	2,92	-1,74
Швейцарский франк	1,80	15,42	20,76	-0,16	3,35
Австралийский доллар	-7,92	12,60	21,65	-2,34	-2,74
Российский рубль	-15,82	28,02	-8,46	3,00	6,50
Японская иена	4,68	16,35	15,06	-7,18	-9,38

*Рассчитано на основе данных официального сайта Центрального банка Республики Узбекистан <https://cbu.uz/ru/>.

Как показано в Таблице 2, в период с января 2018 по январь 2019 годы доход могли бы принести инвестиции в доллары США – 2,45% и швейцарские франки – 1,80%, остальные иностранные валюты показали снижение обменного курса к узбекскому суму, причем самый большой убыток принесли бы инвестиции в российские рубли. С января 2019 года по январь 2020 года наоборот наибольшая доходность наблюдалась у российского рубля – 28,02%, а наименьшая у евро – 11,28%. В период с января 2020 по январь 2021 года первое место по доходности занимал австралийский доллар с 21,65%, второе – швейцарский франк с доходом в 20,76%, самые худшие показатели были у

российского рубля – минус 8,46%. В период с начала 2021 года по начало 2022 года наибольшая доходность наблюдалась у китайского юаня – 6,00%, наибольший убыток продемонстрировала японская иена – минус 7,18%. С начала января 2022 года по начало января 2023 года самый большой доход от инвестирования принесли бы вложения в российские рубли – 6,50%, самый большой убыток претерпели бы вложения в японские иены – минус 9,38%.

Проанализируем доходность инвестиции в представленные 8 иностранных валют на срок более одного года, а именно на любые 2-4 года в период 2018-2023 годов (Таблица 3).

Таблица 3. Доходность инвестиций в иностранные валюты на период от 2 до 4 лет

(в процентах)

Наименование валют	2018-2020	2018-2021	2018-2022	2019-2021	2019-2022	2019-2023	2020-2022	2020-2023	2021-2023
Доллар США	16,85	2,54	32,97	25,35	29,79	34,91	13,80	18,29	7,63
Евро	8,53	28,42	25,09	33,87	28,27	25,69	15,27	12,95	-6,11
Китайский юань	9,16	30,55	35,74	32,08	40,01	33,77	24,35	18,81	1,27
Канадский доллар	12,64	28,06	30,10	34,28	38,20	35,79	15,50	13,49	1,12
Швейцарский франк	17,49	26,41	41,65	39,37	39,15	43,81	20,57	24,61	3,19
Австралийский доллар	3,68	41,87	23,18	36,97	33,77	30,11	18,81	15,55	-5,02
Российский рубль	7,77	26,13	1,61	17,19	20,70	28,55	-5,72	0,42	9,70
Японская иена	21,79	-1,35	30,07	33,87	24,26	12,60	6,80	-3,22	-15,89

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В Таблице 3 показаны показатели доходности инвестиций в иностранные валюты на срок от 2 до 4 лет. Можно увидеть, что в каждом из указанных периодов лидерство по максимальному размеру дохода переходило от одной валюты к другой, например, лучшей иностранной валютой на период инвестирования с января 2018 года по январь 2020 года стала японская йена с 21,79%, а самой худшей – австралийский доллар с 3,68%. В период с 2019 по 2022 годы самый большой доход могли принести

инвестиции в китайский юань – 40,01%, на втором месте находился швейцарский франк – 39,15%, на третьем месте – канадский доллар с доходностью в 38,20%. При этом самую низкую доходность принесли бы инвестиции в российский рубль и японскую йену.

Рассмотрим доходность инвестиций в иностранные валюты за весь изучаемый период с начала января 2018 года по начало января 2023 года (Рисунок 2).

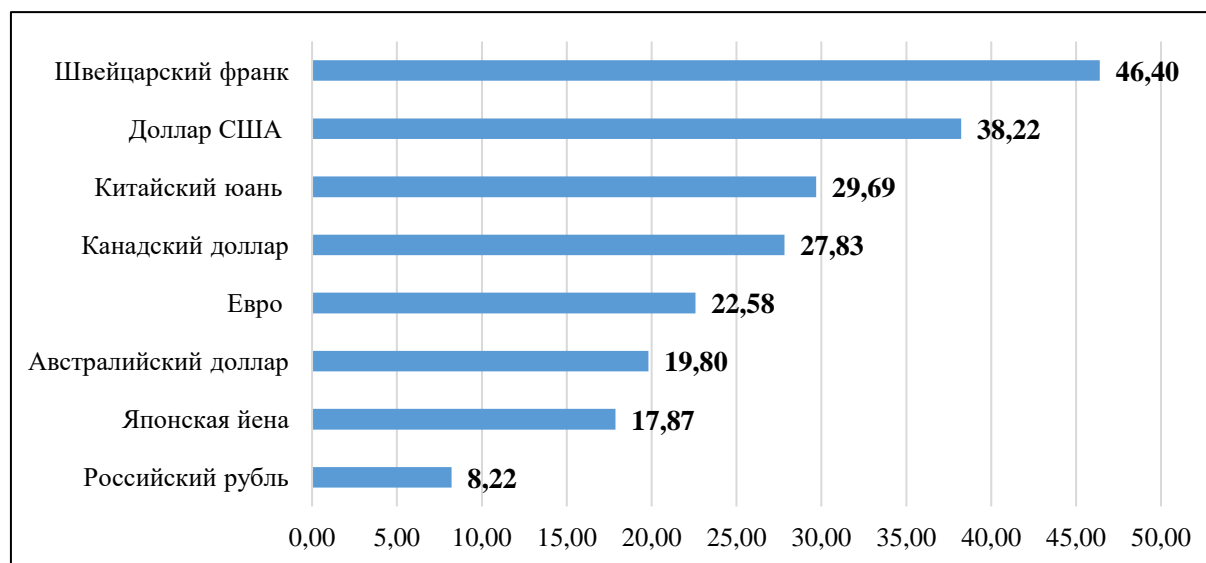


Рисунок 2. Доходность инвестиций в иностранные валюты на период с начала января 2018 года по начало января 2023 года (в процентах)

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Как мы можем увидеть на Рисунке 2, в указанный период самый большой доход принесли бы вложения населения в приобретение швейцарских франков – 46,40%, на втором месте по доходности находится американский доллар – 38,22%, что подтверждает надежность данных валют в качестве объектов для долгосрочных инвестиций. Инвестиции в евро принесли бы средний доход в 22,58%, а самую маленькую доходность принесли бы инвестиции в японскую йену и российский рубль. Полученные результаты позволяют нам оценить доходность инвестиций в иностранные валюты по номинальному показателю без учета инфляции за указанный период времени. Поскольку инфляция является фактором систематического риска, влияющим на реальные показатели доходности всех 8

иностраных валют, то общие тенденции остаются без изменений, хотя в некоторых случаях доходность инвестиций в иностранные валюты может оказаться ниже фактического уровня инфляции.

Таким образом, по итогам проведенного анализа можно сделать вывод о том, что инвестирование в иностранные валюты путем их приобретения может использоваться домашними хозяйствами в качестве потенциального источника получения дохода, однако, такие инвестиции требуют наличия определенного уровня финансовой грамотности населения и обладания практическими умениями и навыками проведения постоянного анализа динамики обменных курсов иностранных валют.

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Article



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IMPROVING THE SYSTEM FOR PROVIDING THE COMPETENCE OF HUMAN RESOURCES AT SERVICE ENTERPRISES

Abstract: *The effective use of labor resources in service enterprises is aimed at providing relationships between them, combining and integrating functions based on special principles within a single system. This article has developed a classification of the basic principles that provide the effective use of labor resources and the effective formation of a system for their management in service sector enterprises. The model of corporate competence in the service sector is developed on the basis of behavioral indicators related to employee performance, effective communication, professionalism, business understanding and initiative.*

Key words: *service sector enterprises, labor resources, management system, competence, competence indicators.*

Language: English

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Introduction

Currently, in order to develop the activity of service enterprises in the conditions of innovative development of the economy, it is of particular importance to pay attention to improve the system of training them for modern professions and increasing their competence based on the formation and determination of the demand for specialists-employees in the field. Because at the current stage of development, the introduction of digital technologies in the field of service is placing high demands on qualified employees to perform the tasks of improving the quality of service. This situation makes it necessary to develop and implement a strategy for providing employees of all categories, which are important for enterprises and industries.

MAIN PART

In our opinion, it is necessary to implement the following measures in the training of highly qualified specialists in service enterprises:

- providing the continuity of the process of professional development and retraining in the field. In this case, the main goal is to improve the skills of

employees, which will lead to an increase in the quality and efficiency of the provided services;

- it is necessary to pay special attention to the organization, planning, and formation of professional qualifications and skills of the service delivery process in order to ensure the appropriateness of the work performed by employees during the service delivery process;

- organization of training workers for the second or substitute profession. In this case, employees in the field specialize in several specialties and quickly adapt to the conditions of the service market;

- it is necessary to form a system of retraining of secondary, secondary specialized and higher educated personnel for specialization in the types and forms of innovative services in the service market.

Effective use of labor resources in service facilities is aimed at providing mutual relations between them, combining and integrating functions on the basis of special principles within a single system [1]. Table 1 lists the main principles that provide effective use of labor resources and effective formation of their management system in service enterprises.

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In the conditions of the innovative development of the economy, the goal of improving the labor organization system in service enterprises is to provide the competitive advantage of enterprises in the market with the application of knowledge economy and the formation of competent teams that can act taking into account their own interests.

In this case, the formation of the goals of the labor process management system implies, on the one hand, the striving to provide the specific needs of the workers, and on the other hand, the solution of the assigned tasks in the process of personnel management. The effectiveness of the use of labor resources in service enterprises depends on the extent to which the level of the given group of goals corresponds to the practice. From the point of view of

the employee, needs are expressed through labor functions performed in relation to specific work processes [2].

The formation of goals for labor management in the provision of employees of a service enterprise is presented in Figure 1. In the formation of a system of goals for calculating the needs of employees in service enterprises, the target tasks are not contradictory and create an effective, objective basis for mutual relations to achieve common goals. The effectiveness of the formation of the labor resources management system often depends on choosing the optimal options of the enterprise's self-management system, understanding the mechanism of its formation, methods of working with candidates, and choosing the optimal technologies [3].

Table 1. Basic principles of efficient use of labor resources and their management system in service enterprises

Title	Content
Progressivity	The system of effective use of labor resources and their management in service enterprises must be in line with the advanced level in our country and abroad.
Prospective	The system of efficient use of labor resources and their management should be constantly developed, ensuring dynamic stability and efficiency due to the search for promising directions of development of service enterprises.
Complexity	Analysis of all factors influencing the effective formation of labor resources management system in enterprises.
Operativeness	Improving the system of management of labor resources in the service sector, operational exclusion of outdated activities or development of modern developments.
Optimality	Optimizing the choice of the most reasonable option for development and the organization of labor processes, taking into account the specific conditions of work at the service enterprise.
Scientific	Effective use of labor resources and their management system, taking into account the competitive environment, the level of service development, and the legal framework, relying on the latest advances in science, technology and technology.
Alternative	Ensuring the alternation of individual leaders and structural parts in the horizontal and vertical sections of the labor resources management system.
Compatibility	It is necessary to be in harmony and synchronicity with the main goals of business entities in the mutual relations between different alternative links in the horizontal and vertical links of the labor organization system.
Versatility	The system of labor organization in enterprises can be implemented both horizontally and vertically in various administrative-economic, economic and legal channels.

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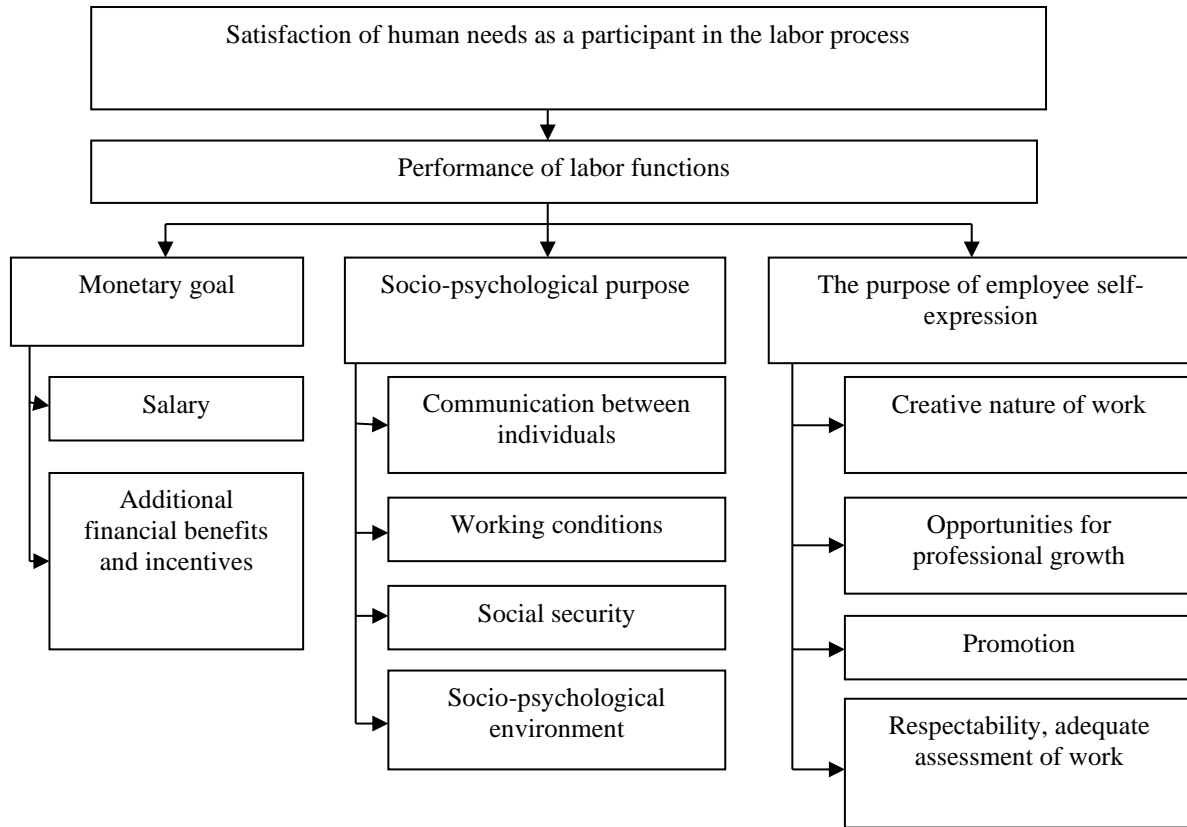


Figure 1. Formation of goals for labor management in the provision of employees to the service enterprise

In the conditions of the innovative development of the economy, experts came to the conclusion that one of the main components of the effective operation of the enterprise is the methods of managing their joint activities and increasing attention to personnel in the conditions of highly automated technologies [4]. Also, the main idea of effective use of labor resources: social innovation is as important as technological innovation; capital is invested not only in technologies, but also in personnel; coordination of employee activity is ensured by means of mutual understanding and communication; problems are solved together in the team [5,6].

In the work experience of some organizations, the corporate competence is used as a practical tool in the work of HR-service (selection of new employees and creation of personnel reserve, development of career growth project, development of attestation-evaluation activities of employees, formation of training system of all employees and creation of personal development plan). development of the model is important. Taking into account the specialization of the employee's activity, professionally important values, knowledge, skill, skills and mental-aesthetic instructions are determined, which form the basis of competence [7,8].

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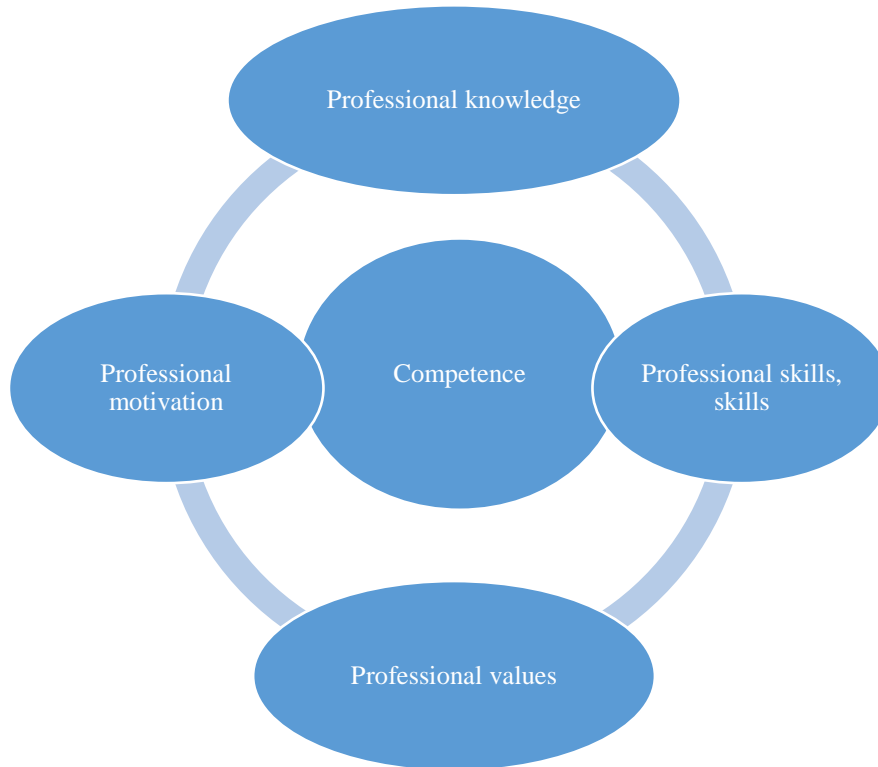


Figure 2. The model of formation of employee competence in organizations of the service sector

In our opinion, the approach to competence formation represents the stages and principles of its model development. Technologically, it is divided into four stages:

- strategic (determining core competence for enterprises);
- operational (establishing behavioral indicators for each process by position);
- qualification (classification and evaluation of behavioral indicators in accordance with the rating scale);
- check competency models.

Competence combines cognitive, operational, motivational and axiological aspects (Figure 2).

Based on this, the employee works efficiently as a result of the combination of four factors: professional knowledge; professional skills based on personal characteristics; motivation for activity,

willingness and readiness to perform it; readiness to work in this enterprise or organization, accepting and sharing the culture and values of the enterprise (organization). The components presented in Figure 3 are shown as sources of job requirements when creating a competency model. Above, we tried to explain the description of the methodological basis of the introduction of the competence approach to modernize the system of management of workers' activities in labor departments. In the course of further research, we will try to justify the need to develop an algorithm for the introduction of the competence approach, which will allow us to increase the efficiency of the use of labor resources in service enterprises. For these purposes, we have analyzed several theoretical approaches and the practice of service enterprises.

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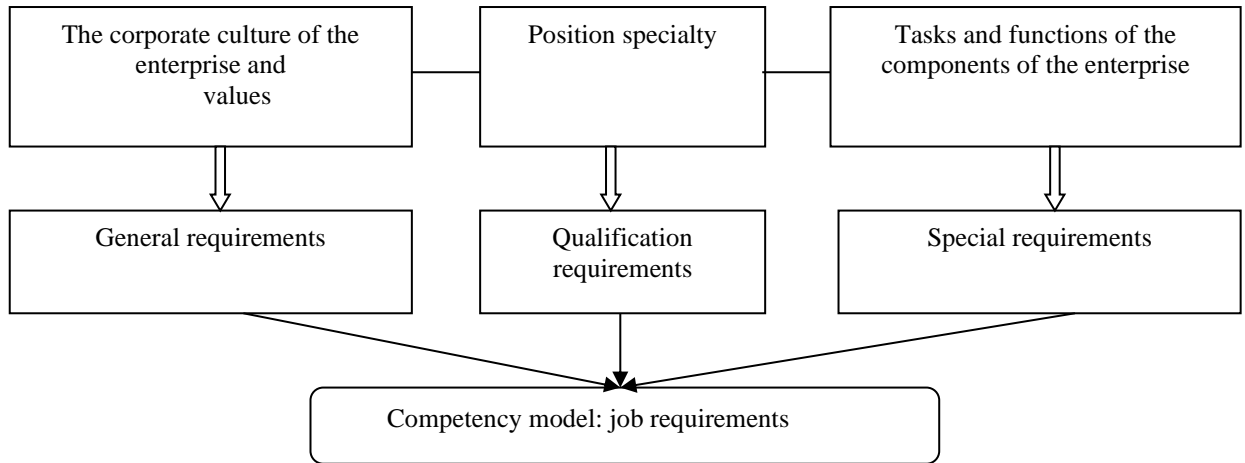


Figure 3. The main sources of general, specialization and special requirements for the position in the development of the competency model in the service enterprise

Practice shows that the most effective method for competence development is the "critical incident method". In order to increase the efficiency of the use of labor resources, the algorithm described within the framework of the application of this method of competence design is implemented in the following order:

1. Determining the main tasks performed by the employee in this position.
2. Determining the quality of competence, the employee can successfully perform the specified tasks.
3. Generalization of received information.
4. Determination of "inverted" qualities of the employee engaged in this position (in order to fully

reveal the picture and determine exactly what the competencies are).

5. Defining the description of each competence.

The demands of competition in the modern business environment make it necessary for employers to increase the demand for their employees, change the priority in the evaluation of employees. In research, competence is defined as a set of characteristics necessary for successful activity. According to this diagram, each competency represents a combination of professional knowledge, skills, guidelines, and directions.

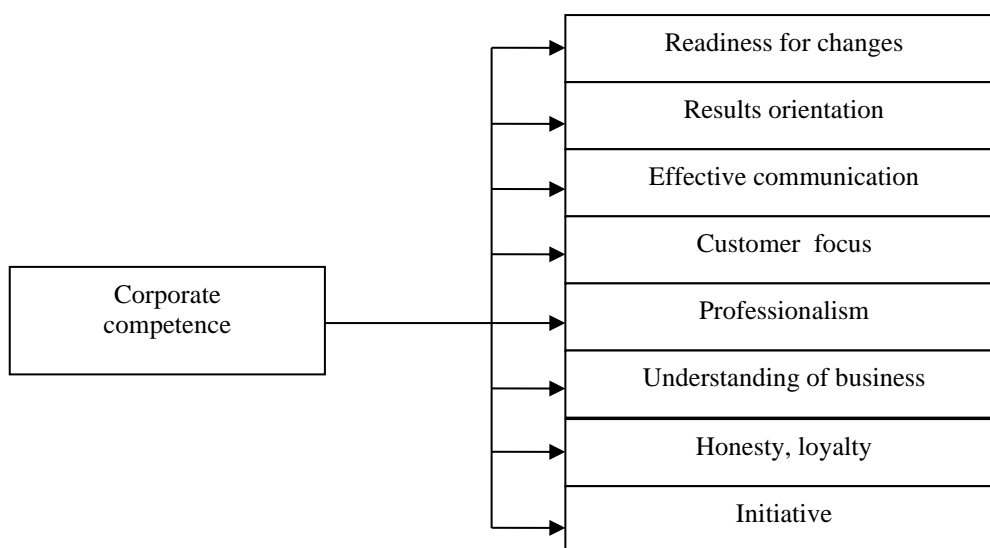


Figure 4. Corporate competencies in the service sector

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Competencies include those that are universal to corporate responsibilities and those that are specific to specific positions. Let's take a look at specific

examples. The established list of corporate competence of the sales specialist is presented in Figure 4.

Table 2. Indicators of corporate competence

Competence	Behavioral indicators
1. To changes readiness	1.1. Quick psychological adaptation to changes in external demands and conditions; positive impact on change. 1.2. New experiences, learning new ideas and a new approach. 1.3. Ability to learn and implement new knowledge and skills.
2. Results orientation	2.1. Goal orientation and determination in achieving the tasks. 2.2. Ability to work under time constraints. 2.3. Maintaining labor productivity and high work capacity in conditions of prolonged workload.
3. Effective communication	3.1. Confidence in information related to an information resource. 3.2. The ability to hear and listen to a partner. 3.3. Ability to connect and support others. 3.4. Compliance with written communication standards.
4. Customer orientation	4.1. Understand the ability and importance of identifying internal and external customer needs. 4.2. Ability to take personal responsibility for solving problems that arise in the process of working with customers. 4.3. Constructive perception of criticism, ability to solve controversial issues.
5. Professionalism	5.1. Having the necessary professional knowledge. 5.2. Availability of necessary skills for effective work in practice. 5.3. Motivation to improve professional knowledge and skills.
6. Understanding the business	6.1 Understanding business at the industry or industry level. 6.2. Understanding of enterprise-level operations. 6.3. Formation of entrepreneurial skills.
7. Loyalty	7.1. Alignment of corporate interests with personal interests. 7.2. Be courteous to your employer. 7.3. Show loyalty within the company team.

Then, from the characteristics of all collected information, behavioral indicators of corporate competencies characteristic for this position are recorded (Table 2).

It is necessary to record the profile of the competence of a specific position received in the form of a document. As a result of the complexity and complexity of the work on the modernization of the personnel management system based on the competent approach, it is not possible to provide examples of all possible documents. Therefore, we will consider the algorithm for the example of the formation of the competence of a sales manager. An example of a specialization for a sales manager is shown in Table 2.

In the process of research, standards of employee activity are established and behavioral indicators of a successful work process are formed. The leader should evaluate his subordinates on their success or failure during the reporting period, and the employee should perform self-evaluation. Evaluation results and personnel development allow the management to increase the efficiency of achieving the set goals,

through the systematic management of personnel by management departments, they can quickly perform their work tasks, and employees begin to move consciously along the path of professional and career growth.

In our opinion, the assessment scale for the development of competencies in the service sector is carried out in the following order:

1. Expert assessment. The development of an accurate assessment of competence in the worker increases in demand: all indicators of competence are manifested in behavior and can increase the expected result in terms of quality, quantity and independence in the demonstration of the necessary indicators of competence in the main field of activity. Additional indicators related to this competence can be shown, that is, the employee has complex skills or knowledge that are important to increase the effectiveness of the implementation of the competence. There will be no negative indicators. The competency can be applied in a complex work situation. It is recognized by experts as a good source of information on all its work

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features, a model for others. Development in such competencies is not required.

2. Skillful application (standard). Competence development corresponds to the required level compared to the competence specialization of this position. Most indicators of competence evaluated in all work situations are independently demonstrated. There are no negative indicators. It is possible to independently demonstrate competence without supervision, based on general guidance and in daily work. In acquiring all aspects of competence, interest arises and they develop. Development in this competency requires minimal instructional or on-the-job learning.

3. Basic (basic). This position is the development of competence on the basis of low requirements for the competence specialty. The worker is able to demonstrate the main components of the competency indicators or up to 80% of the indicators related to the evaluated competencies. In the normal course of work, the information of the main component of competence is displayed. There are no negative indicators, but their percentage is not high (20%). In a more complex work process, the emergence of competency standards is necessary to control or maintain quality. Competencies need to be developed in many ways. An interest in mastering all aspects of competence arises in the worker and they develop.

Table 3. Formation of the special competence model of the sales specialist in the enterprise

Competence	Level of competence	Description
Stress resistant	A (4)	<ol style="list-style-type: none"> 1. Managing the development of the situation can create a problem in the task in order to achieve the highest result. 2. Anticipating a stressful situation motivates people to succeed under pressure and stress. 3. Creates working conditions for the team, helps to increase their mobility in stressful situations. 4. Is a role model, teaches other workers, shows how to effectively handle stressful situations.
	B (3)	<ol style="list-style-type: none"> 1. Managing the development of the situation can create a problem in the task in order to achieve the highest result. 2. Anticipating a stressful situation motivates people to succeed under pressure and stress. 3. Creates working conditions for the team, helps to increase their mobility in stressful situations. 4. Is a role model, teaches other workers, shows how to effectively handle stressful situations.
		<ol style="list-style-type: none"> 1. The effectiveness is stable, a positive approach to work is maintained in stressful situations and can give it to others; calmly attracts partners and customers. 2. Recovers quickly after stress.
	V (2)	<ol style="list-style-type: none"> 1. Usually calm at work, able to withstand external negative influences. 2. Solves problems as soon as they arise, does not get worried in advance. 3. Calm enough. He feels the need to support the leader in complex stressful situations. 4. Decrease in work capacity in stressful situations is insignificant.
	G (1)	<ol style="list-style-type: none"> 1. He loses his composure. Objectivity in stressful situations, not losing oneself. 2. Worry about problems in advance. It loses its initial working conditions when it changes. 3. Impatience with clients and team. He cannot control himself. 4. Become confused or disoriented and stop working.

4. Inappropriate. The development of the evaluated competencies is seriously low in accordance with the competence specialization of this position. Indicators related to competencies are not displayed or an error is displayed that leads to the performance of inappropriate tasks. It can also create a negative

pattern of behavior and the percentage of them will be high. The level of competence development is unacceptable and meets the minimum requirements. A significant increase in competence is required in many aspects. However, the worker will not have the desire to improve competencies.

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The evaluation system proposed in the research work allows employees to determine their place in the corporate structure, to see their future growth, and to know the opportunities for professional development and career growth.

In linear management, leaders have criteria for selecting subordinates to perform certain tasks. Managers regulate the algorithm of career growth and rewards based on their contribution to the results of the enterprise.

An important result expected from the introduction of the new model of the evaluation system is to create a comprehensive and maximum objectivity of the contribution of each employee to the enterprise, to understand the current level of human development and its perspective. The result of improvement is the creation of a universal and technical system, which implies the precise and rapid implementation of change, training, transformation, addition. Many assessment tools, a significant number of developing programs should provide new opportunities to the community of all business structures.

Each subject has the right to realize such a structure of the model of the competence of specialists and their potential effect. In our opinion, the benefits of the implementation of the model for the enterprise are as follows:

- the availability of accurate information on how effectively human resources are used in enterprises and organizations and the quality of their resources;
- specifying the requirements of the enterprise (organization) to the employee and determining the criteria for evaluating the results;

- to identify problems and difficulties that prevent workers from achieving the necessary performance indicators;

- designing the main directions of training, upgrading and development of workers;

- increasing labor productivity and quality of services by increasing the level of responsibility and motivation of workers;

- to have a source of important information for the management about the state of the enterprise (organization)'s work based on facilitating the flow of information vertically from bottom to top.

The employee himself has a certain effect: the recognition of his achievements by the management encourages them to work hard and efficiently for the benefit of the company; managers have the opportunity to determine for themselves the requirements for their work; increases the level of employee loyalty to the enterprise and its goals.

CONCLUSION

According to the results of the research, a competent approach to improving the efficiency of employees' work in enterprises and modernizing its management system appears as an effective new social technology that provides for obtaining complete and objective information about the personal and professional quality of employees and their work results, and in a positive socio-psychological microclimate in the team provides the involvement of employees in the decision-making process.

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ANALYSIS OF DATA MINING METHODS IN ELECTRONIC EDUCATION

Abstract: The relevance of using data mining methods to support management in the electronic education process is substantiated in the article. The main methods of data mining within the framework of e-education are described in detail, and an overview of the main scientific works devoted to this area is presented. These methods may be useful in decision support systems at all levels of management of the educational process.

Key words: data mining, educational process, e-education, method, forecasting, analysis of educational data.

Language: English

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Introduction

Varieties of data mining techniques are used in different educational contexts. The main goal of these methods is to transform data into information that would be relevant to the educational process and to search for patterns to make the best decisions in a given area. The process of data analysis includes the following stages: pre-processing the data, identifying patterns using various data analysis methods, testing the found patterns, applying these patterns to predict future events in the field of education, and using the resulting forecasts in decision-making and formation of education policy.

Publications that contain evidence and experimental bases on the most pressing issues related to the use of the application of mining methods in the e-learning system were analyzed in this article.

The study in [1] proves the relevance of using data mining methods in the educational process to support decision-making on its management. The article proposes a software application that provides data analysis using complex classification algorithms.

In [2], the authors proposed several educational data mining methods to assess the learning behavior of students in an e-learning system. These methods include cluster analysis aimed at determining the most popular time threshold for completing a task in one session, data analysis and visualization to highlight the main parameters that contribute to the effective completion of courses, and V-fold cross-validation using statistical processing, which makes it possible to group students by main indices of their activity to determine the relationship between a high percentage of activity and academic performance. The analysis showed that it was possible to optimize course navigation and time spent on assignments if information about important e-learning tools was available.

Methods for analyzing educational data and their differences from data mining methods were discussed in [3]. The areas of application of educational data analysis and the benefits it provides to all participants in the educational process were also analyzed.

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In [4], various methods for analyzing data on student performance are discussed. The focus is on predicting the academic achievements of students in undergraduate programs, as well as studying typical student progressions and combining them with prediction results. About 10 classification algorithms were used for prediction.

The goal of the study conducted in [5] is to develop the fundamentals of self-optimization technology for software systems as part of e-learning. It is based on the formulated and formalized principle of reflexive adaptation of software, applicable to a wide class of software systems and based on the identification of new knowledge in the behavioral programming of the system.

In [6], the features of applying data mining and machine learning tools to small data sets are discussed. This article is not a review of popular methods of machine learning and data mining, however, the collected and presented material could help the reader achieve satisfactory results when applying the described computational methods.

According to the study conducted in [10], in modern literature on psychology and pedagogy special attention is paid to identifying factors that influence students' academic success. Statistical methods are used to analyze the influence of the studied parameters on academic performance. However, the conclusions drawn from such analyses often are problematic because the test results from a specific sample of students are not applicable even to individual students in the same sample. This situation requires the identification of possible factors that limit the reliability of the research, the need to pay attention to the specifics of the data to be analyzed and the size of samples from the general population on which this analysis will be performed.

In reference [11], Data Mining technologies are discussed and the main stages of data processing are pointed out. The architecture of Data Mining is presented and the main methods are shown focused on the core tasks of Data Mining. The main tools of Data Mining technologies are assessed.

In this article, the authors analyze data mining methods in an e-learning system. They discuss examples of the application of these methods and the potential benefits they can bring to education.

Analyzing educational data can help identify problems and find solutions to improve performance and learning. This can be used to predict student performance, model and understand their behavior and learning style, and identify groups of students based on the outcomes and process of learning.

Besides, data analytics can help to visualize complex and multidimensional data, allowing us to understand structure and find latent dependencies. This can be useful for organizing educational content, planning and scheduling, and developing personalized recommendations for students.

Social network analysis can also be used to study relationships between students and teachers, as well as between students. This can help create a positive learning environment and identify problems that may be affecting performance.

Finally, educational data analysis can help identify latent problems in academic performance. By analyzing students' behavior when interacting with educational materials, it is possible to identify problems in learning, lack of motivation, and attempts to deceive the educational system.

MAIN PART

Educational data analytics is a powerful tool that can help teachers and students improve their learning and achieve better results. There are many data mining methods and algorithms. Let us consider the features and application of these methods.

1. Artificial neural networks

Features: Imitate the functioning of the human brain, consisting of neurons that process input data and transmit signals.

Application: Solving problems of classification and forecasting.

2. Decision tree

Features: Classify, predict, and describe important features.

Application: Question-based data separation and decision-making.

3. Nearest neighbor method and k-nearest neighbor method

Features: It is based on proximity between data objects.

Application: Classification and clustering based on the proximity of objects.

4. Support Vector Machine

Features: Find a separating hyperplane of maximum width between two data classes.

Application: Classification and regression.

5. Bayesian networks

Features: Model probabilistic relationships between variables.

Application: Forecasting and identifying relationships.

6. Linear regression

Features: Predict the dependence of one variable on another or several other variables.

Application: Forecasting and analysis of regression problems.

7. Correlation and regression analysis

Features: Explore relationships between variables.

Application: Analysis and forecasting.

8. Hierarchical and non-hierarchical methods of cluster analysis:

Features: Group data objects according to their similarities.

Application: Classification and identification of data structure.

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9. Methods to search for association rules

Features: Find relationships between variables or data objects.

Application: Finding associations in data, for example, using the Apriori algorithm.

10. Evolutionary programming and genetic algorithms

Features: Model evolution and selection processes in nature.

Application: Optimization and search for the best solutions.

11. Limited search method

Features: Solve combinatorial optimization problems.

Application: Selecting the best option from a finite set of possible options.

12. Data visualization methods

Features: Presentation of data in graphical format for easy understanding and analysis.

Application: Data visualization to identify patterns and understand data structure.

Let us consider the features of using some methods for educational purposes in electronic education.

Artificial neural networks. The use of neural networks in learning opens up broad opportunities for innovative methods of information processing. Here are a few ways neural networks can be used for educational purposes:

processing of text information:

- automatic assessment of essays and answers to questions.
- generation of automatic feedback and recommendations for improving writing skills.
- recognition and analysis of text data to provide personalized learning materials.

processing of audio information:

- speech recognition for automatic assessment of the level of oral communication skills.
- creation of personalized audio tasks or training programs, considering individual pronunciation features.

processing of graphic information:

- automatic evaluation of drawings and graphic works.
- pattern recognition for creating interactive educational materials.

processing of video information:

- analysis of student behavior during training.
- providing feedback based on visual analysis while completing tasks.
- creation of personalized training programs:
- using training data to create customized courses or lessons.
- adapting the pace of learning depending on the student's level of understanding.

analysis of individual student problems:

- using training data to identify weaknesses and provide additional resources if needed.

- creation of special tasks:
- automatic generation of individual tasks aimed at solving specific student problems.

These approaches allow teachers and educational programs to provide more effective and personalized teaching methods, which can lead to better student learning.

Forecasting. Forecasting, in the context of machine learning, is the process of creating a model from training data to predict the values of a target variable for new data. Different methods are used depending on the type of target variable.

Regression is used when the target variable is a continuous numeric value. For example, using data on the number of hours spent studying; the final grade can be predicted using regression models such as linear regression.

Classification. Classification is used when the target variable is categorical, i.e., it accepts a limited number of classes or labels. The process of training a model includes selecting an algorithm, identifying features (independent variables), preparing data, training the model, and evaluating its performance on new data. Once trained, the model can be used to predict values of the target variable for new data that were not part of the training set.

Detecting structure in data. Algorithms for detecting structure in data aim to identify patterns, groups, or clusters in data without prior knowledge of the structure.

CONCLUSIONS

Data mining approaches demonstrate effectiveness and efficiency in existing e-learning systems. The distinctive feature of traditional e-learning systems is that they are query-based without the use of data mining or heuristics. Therefore, robust data mining approaches need to be included in the developed e-learning system to find clusters in educational data. Data mining methods work effectively with large volumes of data, making education systems reliable and capable of solving interdisciplinary problems related to emotional learning and e-learning. For future research, data mining approaches can be improved by making them more sensitive to knowledge generation and providing assistance that is more objective to students. Large and real data sets can be created to analyze the behavior of the data mining approaches developed.

Using several data mining techniques for educational purposes can significantly improve the learning process and help in making informed decisions based on available information.

The use of data mining methods in e-education provides significant benefits for managing the educational process. The relevance of this approach is due to the growing volume of data generated in e-education and the need to effectively use it to improve

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the quality of learning and manage educational programs.

The main data mining methods in e-education include:

- analysis of student attendance and activity data: cluster analysis methods can be used to identify groups of students with similar educational goals;
- classification that can help predict academic success and provide guidance for students facing difficulties;
- the use of machine learning to predict academic performance;
- machine learning models (such as regression and classification) can be applied to predict student success based on their previous performance, activity, and other parameters;
- association analysis methods that can help identify relations between certain teaching methods and student success, these methods can lead to the optimization of educational programs;

- personalized learning: the use of recommender systems and collaborative filtering algorithms to provide personalized content and resources to students;

- feedback monitoring and analysis: the use of natural language analysis and processing to test student-teacher feedback, which can help improve the quality of the educational process.

A review of the main scientific studies in this area allows us to see development trends and determine the most effective methods and approaches. Decision support systems based on these methods can be implemented at all levels of educational management - from decision-making at the curriculum level to adapting approaches to the individual needs of students.

In general, the use of data mining methods in e-education not only improves management efficiency but also contributes to the innovative development of educational systems, making them more adaptive and focused on the needs of students.

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MORPHO-BIOLOGICAL AND ECONOMIC CHARACTERISTICS OF INTENSIVE APPLE VARIETIES

Abstract: The article provides information on summer Dayton, Vadimovka, early autumn Wagnera prizovoe, autumn Pamyat Esaulu and winter Goldrash varieties with average growth of trees, fruit marketability indicators and high yield for intensive type apple orchards, the tasting value of the fruits of these varieties was 4.5-4.6 points, the yield indicators were 21.0-35.5 kg per tree.

Key words: intensive, orchard, cultivar, fruit, biometric indicator, branch diameter, body circumference, leaf level, assimilation level, fruit size, tasting, tree, productivity.

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Introduction

The development of intensive horticulture envisages the use of fast-harvesting, high-yielding weak growing varieties. One of the main factors in providing the population with fresh, juicy apple fruits all year round is: The ripening time of the fruits of its assortment is different, especially the long shelf life of the late autumn and winter varieties.

Apple is one of the most important fruit plants of the horticultural industry. Today, its total area exceeds 6,378,000 hectares, and its total yield exceeds 89.3 million tons¹. Further increasing the productivity of apple orchards involves the creation and industrialization of completely new varieties that are biologically useful and economically efficient [17; 47-49-p.], [1; 3-17-p.].

In order to further increase the effectiveness of intensive apple orchards established in the republic today, it is an urgent task to select high-yielding varieties based on the study of the morpho-biological

and economic characteristics of new introduced and local varieties, to determine productivity indicators, and to develop effective agrotechnical elements specific to a particular variety, finding an effective solution to these tasks will allow to sufficiently increase the productivity of intensive apple orchards and the quality of the fruit grown in them.

Research methodology: Studies on the study of morpho-biological and economic characteristics of intensive apple varieties were carried out in the intensive orchard planted in the low M-IX graft of apple in the soil-climatic conditions of the Tashkent region in 2020-2022. According to the ripening period, 35 different varieties of apples were divided into summer, early autumn, autumn and winter groups.

Apple trees were planted in a 4.0x2.0 m scheme, in vertical symbags, and grown by palmette method, and calculations and observations were made in 4 repetitions out of 5 trees in each option.

¹<https://ru.wikipedia.org/wiki/%D0%AF%D0%B1%D0%BB%D0%BE%D0%BD%D1%8F>

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The height of the tree was measured on a measuring rod with 1 cm divisions. This measurement was performed at one time (end of vegetation) - after harvesting, i.e. after straightening branches without fruits.

The diameter of the branch was measured in the same terms as the height of the tree and on a measuring rod. For this purpose, in trees with spherical branches, from the left and right sides, along the row, perpendicular to the soil, according to the tightest diameter of the cross branches. At the junction of this perpendicular with the ground, two marks were placed along the row and transverse to it. The distance between the marks was measured on a ruler. The average value was calculated from two measurements.

Body girth was measured at the end of vegetation in two mutually perpendicular directions (along the row and across) using a barbell at a height of 30 cm above the soil level. From the two measurements, the average diameter of the body was found, and then its circumference was calculated according to the following formula:

$C = \pi \times D$; here: π – is a constant number and it is equal to 3.14, D – body diameter [4; 5–15-p.], [13;

253–299-p.].

Leaf level - after the leaves have fully developed (August, September) was determined by the weighting method recommended by A.A. Nichiporovich [11; 11-46-p.]. Leaf level was calculated on trees in five typical trees - vegetative and fruit crops. For this, leaves were taken in four replicates from 10 common branches, 10 spear branches and 10 vegetative branches. The number of leaves in one tree, its level and assimilation level were calculated.

Average fruit weight was determined for trees in each experiment and each replicate by randomly selecting 200 fruits from the harvested crop, weighing them, and dividing the total weight by 200.

Fruit size was determined using GOST 21122-75 [5; 10-p] indicators (Table 1).

Evaluation of the taste of fruits was determined by tasting them, that is, by conducting a tasting at the time of their consumption. For this, normally developed fruits, not affected by diseases and pests, were selected. Evaluation criterion was carried out in apple fruits on a 5-point system for all indicators, and the division of total points represented the final score given to the fruit.

Table 1. Fruit size, g.

Very small	Small	Little	average	average big	Big (large)	Very large (very large)
till 25,0	25,1-45,0	45,1- 90,0	90,1-135,0	135,1-180,0	180,1-250,0	250,0<

Estimates of yield per tree were calculated in 4 replicates from 5 trees in each variant.

Statistical analysis of research results was calculated in Excel 2010 and Statistica 7.0 for Windows computer programs with a confidence interval of 0.95% according to the method of B.A. Dospekhov [6 301–325-p].

Research results and their analysis: Increasing the productivity of apple orchards and fruit quality is mainly done in two ways; firstly, the application of high agrotechnical measures in the garden, and secondly, the introduction into production of intensive varieties and hybrids adapted to each soil-climatic conditions, yielding high-quality fruit. It is known that properly selected varieties ensure high and quality harvest under appropriate agrotechnical conditions.

Intensive horticulture is also changing the demand for apple varieties. In the establishment of intensive type apple orchards, it is required to plant short, mechanized, resistant to diseases and pests, no or weak shaking, spur-type varieties. In addition, the direction of use of the fruit (for fresh consumption, for processing, export abroad, etc.) and having high results in terms of product quality are considered to be the main indicators of the variety.

In the works of some researchers, the control of the growth strength of trees of different apple varieties is connected with the graft and it is emphasized that the growth rate of the trees depends on the biological characteristics of the variety and the graft [12; 183–184-p.], [10; 241–247-p.], [14; 17–21-p.].

In the researches of a number of scientists, it has been proven that the height of apple trees in seed grafts reaches 6.0-10.0 m, the root system reaches 1.5-2.0 m, depending on the physical properties of the soil, individual roots grow to a depth of 5.0-7.0 m. According to the authors, tree growth is slower in medium-sized clonal grafts, their height reaches 4.0-5.0 m, the root system reaches 1.0-1.5 m, and in low plantations, the height of apple trees reaches 2.0-3.0 m, and the roots grow to a depth of 0.6-1.0 m [15; 19–21-p.], [9; 4–5-p.], [14; 17–21-p.].

The growth power of trees, the size of their trunks, mainly depends on the growth power of the graft and variety to which they are connected, as well as the growing conditions of the trees. Based on this, when creating a garden, it is necessary to choose a suitable planting scheme based on the growth conditions of each variety. One of the main factors determining the suitability of a variety for intensive

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gardens is the height of the trees and their growth characteristics. Reducing the size of the tree increases its suitability for intensive orchards due to the ease of agrotechnical maintenance.

According to the results of the conducted research, the height of the trees of the summer "Pervenets Samarkand" (st) variety was 295 cm, and the branch diameter was 175 cm, compared to the standard variety, it was noted that the height of the trees and the diameter of the branches were smaller in all the summer varieties. According to this indicator, among the varieties of the summer group, the trees of the Kyzil Janoqi and Pristin varieties were found to be the smallest in size. In terms of the size of the body circumference of the trees, in the standard variety, except for the height of the tree and the diameter of the branches, it was at least 17.5 cm, and in comparison with the standard, a higher indicator was noted in all the summer varieties. According to this indicator, among the varieties of the summer group, trees of the Mantet and Stark Erlist varieties had the highest body circumference of 20.9; 22.6 cm.

Analyzing the number of leaves on the tree, tall and relatively wide diameter branches of "Pervenets Samarkanda" (st), "Oydin", "Elena", "Rustamiy" and Williams Pride varieties have leaves (6.4-8.9 thousand pieces) It was found that the number is the most, while the Kyzil Janoqi and Pristin varieties (5.3-5.7 thousand pieces) are the least. The change of the assimilation level of the tree was the highest 22.0-24.0 m² in "Oydin", "Elena" and "Rustamiy" varieties, depending on the number and level of leaves.

Biometric indicators of trees of early autumn varieties are also different, the height of the trees in Red Delishes (st) variety is 260 cm, the diameter of the branches is 160 cm, Compared to the standard variety, the height of trees is the highest in

Prikubanskoe (264 cm), Limonniy (272 cm) and hybrid II-X-11 (287 cm), while in "Farangiz", Wagnera prizovoe (205 cm) and Remo (221 cm) varieties was found to be the lowest. According to the diameter of the branches, a high indicator was noted in the varieties "Israel" (175 cm), Liberty Zimni (165 cm) and hybrids II-X-31 (173 cm), II-X-11 (168 cm). Among the varieties of this group, "Farangiz" (110 cm), Wagnera prizovoe (109 cm) and Remo (115 cm) varieties, which have low tree height, also have a small diameter of branches. The height of the trees was average, and the diameter of the branches was small (105-125 cm) in the varieties Renda (248 cm), Kandil Sinap (244 cm) and Starking Delishes (235 cm).

The number of leaves on a tree is high in Red Delishes (st) (6.0 thousand pieces), Prikubanskoe varieties and hybrids II-X-31 (6.9 thousand pieces), II-X-11 (7.8 thousand pieces) high, on the other hand, the lowest index was recorded in the varieties "Farangiz" (4.9 thousand pieces), Wagnera prizovoe (4.8 thousand pieces) and Remo (5.1 thousand pieces) with smallest size. Different indicators were also recorded on the assimilation level of the tree, and this indicator is the variety "Israel" (24.8 m²) with a large number of leaves and a large surface, and II-X-31 (22.1 m²), II-X-11 (23,9 m²) was found to be higher in hybrids. Although the average number of leaves in the "Bolajon" variety was 5.7 thousand pieces, the average leaf level was the highest at 36.6 cm², so the assimilation level of the tree was relatively high at 20.9 m². It was found that the assimilation level of Renda (14.3 m²), Kandil Sinap (11.5 m²), "Farangiz" (12.6 m²), Starking Delishes (14.4 m²) varieties, which have a small number of leaves and a small surface area, recorded the lowest index (Table 2).

Table 2. Biometric indicators and assimilation level of apple varieties (2020-2022)

Varieties	Biometric indicators of trees, cm.			Number of leaves on a tree, thousand pieces	Leaf level cm ²	Tree assimilation level m ²
	height	branch diameter	body circumference			
Summer apple varieties						
"Pervenets Samarkand" (st) in	295	175	17,5	8,9	23,0	20,5
"Oydin"	278	163	19,9	7,4	32,5	24,0
"Elena"	285	152	19,7	6,9	31,9	22,0
Qizil Janoqi	245	138	18,3	5,3	30,0	21,3
"Rustami"	277	158	19,1	7,1	31,1	22,8
Mantet	265	153	20,9	6,1	32,7	19,9
Stark Erlist	258	148	22,6	5,6	24,4	13,7
Williams Pride	271	145	18,2	6,4	25,9	16,6
Pristine	244	147	18,5	5,7	25,8	14,7
Dayton	255	145	18,8	5,9	28,4	16,8
Vadimovka	250	140	18,9	5,8	28,5	16,5

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Early autumn apple varieties						
Red Delishes (st)	260	160	20,5	6,0	27,7	16,6
Renda	248	125	17,4	5,8	24,7	14,3
Candil Sinap	244	105	14,0	5,1	22,5	11,5
"Bolajon"	253	145	15,3	5,7	36,6	20,9
"Israel"	237	175	17,1	7,7	32,2	24,8
"Farangiz"	205	110	12,9	4,9	25,8	12,6
Prikubanskoe	264	152	21,9	6,3	30,2	19,0
Starking Delights	235	115	17,1	5,5	26,2	14,4
Limonniy	272	149	21,6	5,9	30,1	17,7
Renora Zimnyaya	235	140	16,8	5,4	28,7	15,5
Remo	221	115	14,7	5,1	28,9	14,7
Sunprice	258	155	20,1	5,8	27,4	15,9
Liberty Zimni	255	165	17,0	5,7	29,8	17,0
Wagner prizovoe	205	109	16,8	4,8	31,1	14,9
II-X-31	238	173	18,8	6,9	32,1	22,1
II-X-11	287	168	22,1	7,8	30,6	23,9
Autumn varieties						
King David (st)	256	140	18,9	7,6	27,1	20,6
Kubanskaya bagrennaya	265	155	19,8	6,2	29,1	18,0
Pamyat Esaulu	240	120	14,8	5,3	26,0	13,9
Florina	270	175	21,7	6,1	24,3	14,8
Winter varieties						
"Nafis" (st)	285	160	19,5	7,7	31,2	24,0
Fuji	258	152	16,8	5,7	32,5	18,5
Mutsu	272	178	18,5	6,1	37,8	23,0
Goldrush	253	138	16,3	5,5	27,1	14,9

The height of the trees of the autumn King David (st) variety was 256 cm, the diameter of the branches was 140 cm, compared to the control variety, the size of the trees of the Kubanskaya bagrennaya and Florina varieties was large, and the Pamyat Esaulu variety had a low index for both indicators, and the trees size was found to be small. The number of leaves in the variety King David (st) was the highest 7.6 thousand pieces, the average surface area was 27.1 cm², accordingly, the assimilation level was the highest 20.6 m². According to this indicator, the lowest indicator was recorded in Pamyat Esaulu variety (13.9 m²).

In terms of tree height, diameter of branches, number of leaves, level and assimilation level, winter "Nafis" (st) and Mutsu varieties recorded the highest index, while in all biometric indicators and assimilation level, the Goldrush variety recorded the lowest index.

In intensive orchards, the value of a variety is measured by its cultivation in an intensive orchard, the variety's early harvest, self-pollination (diploid), rate of yield increase, absence of wilting and overall productivity. [16; 3–21-p.]. In addition to the taste and pleasantness of the fruit, it is necessary to pay great attention to its qualities such as road resistance, shelf life, appearance (product appearance), which is the main measure. [7; 13–15-p.], [8; 67–69-p.].

The fruits of the best immune varieties are

characterized by high commercial qualities: the fruits are of average or larger than average size, well-shaped, and uniformly bright in color. It can be noted that in terms of the presence of the most important organic substances, they are not inferior to common localized varieties [2; 10–38-p.], [3; 78–97-p.]. Therefore, when choosing apple varieties, the size of their fruits, their tasting value and their productivity were analyzed.

According to the results of the research, the lowest indicator of the average weight of the fruits of summer group varieties was recorded in the variety "Pervenets Samarkanda" (st) (83.8 g), and it was found that the weight of the fruits is higher in all varieties compared to the standard variety. Dayton (231.3 g) and Vadimovka (236.9 g) varieties have the highest fruit weight, compared to the fruit of the standard variety 176.0-182.7% (2.8 times), local "Oydin" (164, 3 g.), and "Rustamiy" (174.9 g.) varieties are 96.1-108.7% (2 times) larger. The average weight of the fruits is also related to their ripening period, and the average weight of the fruits of the Kizil Jonaqi, Mantet, Stark Erlist, Pristin varieties, which ripen in the earliest summer periods (in the first ten days of June), is relatively small and is 80.8-112.5 g.

The quality of the fruit is determined by its size, appearance, texture, smell, and the taste is also

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important, so the apples were tasted when they were ready for consumption. When tasting the fruits, their appearance, size, color, smell, flesh consistency, sweetness, acidity and taste were taken into account, and a total score of 5.0 was given to its quality.

It is known that the amount of sugars and organic acids and their ratio determines the consumption and taste of the fruit. Acids, flavoring and flavoring (aromatic) substances contained in fruit, enzymes, affect human digestive organs and help to absorb other foods that are packed with fruit faster. They have a special value due to the high content of vitamins.

The biochemical composition of the fruit of apple varieties was also analyzed, and summer Dayton with high sugar content and low acidity (sugar content 12.4%, acidity 0.54%) and Vadimovka (sugar content 12.5%, acidity 0.46%) varieties were given a total of 4.5-4.6 points. According to this indicator, the highest 4.6 points were given to the fruits of the "Oydin" variety, the sugar content of the fruits was 12.3%, the acidity was 0.27%, and the water level was 84.5%. When evaluating fruits, some of their important characteristics increased the value of the fruit, while some of its characteristics caused it to be evaluated with a low value. Due to the small size of the fruit of the "Pervenets Samarkand" (st) variety, low sugar content (9.6%), and high acidity (0.92%), the tasting grade was evaluated with the lowest 3.7 points.

According to productivity indicators, the minimum productivity of one tree in summer varieties was 12.9 kg, and the maximum was 39.6 kg. "Pervenets Samarkanda" (st) yield from one bush was 18.3 kg, compared to the standard variety "Oydin" (36.7 kg), "Rustamiy" (39.6 kg), Williams Pride (27.2 kg.), Dayton (32.9 kg.), Vadimovka (34.9 kg.) yield is higher by 48.6-116.4%, "Elena" (14.7 kg.), Kyzil Janoqi (14.6 kg.), Mantet (17.4 kg.), Stark Erlist (16.8 kg.) and Pristin (12.9 kg.) varieties were found to be

lower by 4.9-29.5%.

Among the early autumn varieties, the fruit of the Red Delishes (st) variety was moderately large, weighing 169.8 g, Compared to the standard variety, the size of fruits of Renora Zimnyaya (184.8 g), "Farangiz" (206.2 g) and hybrid II-X-31 (249.5 g) is larger, average fruit weight by 8.8-46.9%, Prikubanskoe (265.5 g.), "Israel" (275.3 g.), Wagnera prizovoe (305.5 g.) varieties and II-X-11 (250.3 g.) it was found that the size of the fruit of hybrid varieties is very large, and the weight of the average fruit is 47.4-79.9% higher.

In terms of fruit weight, the size of the fruits of the "Bolajon" variety is small, the average weight is 58.4 g, and it is 2.9 times smaller than the fruit of the standard variety, and the fruits of this variety are mainly suitable for processing.

According to the results of tasting the fruits of the early autumn varieties, the fruits of the local "Israel" variety are light red in appearance, bright in color, the consistency of the flesh is soft, sweet (sugar content 12.7%), low in acidity (0.53%), juicy (82.5%) with the highest score of 4.7 points, and the fruits of "Farangiz", Renora Zimnyaya and II-X-11 hybrid were also rated with a high score of 4.6 points because they were sweet, pleasant, juicy.

According to productivity indicators, the minimum yield of one tree in early autumn varieties was 7.7 kg, and the maximum was 39.9 kg. Red Delishes (st) yield from one tree was 16.6 kg, compared to the standard variety Kandil Sinap (7.7 kg), "Farangiz" (14.9 kg), Limonniy (13.9 kg) varieties have a yield of 10.3-53.6% less, Sanprice (33.3 kg.) and Prikubanskoe (39.9 kg.) varieties have the highest yield, 100.6-140.4% compared to the standard variety it was found that there were many (Table 3).

Table 3. Fruit size and yield indicators of apple varieties (2020-2022)

Varieties	Fruit (medium)			Relative to the fruit of the control variety, %	Tasting rating, 5.0 points	Productivity	
	weight, g.	height, cm	diameter, cm			from one bush, kg	relative to the control variety, %
Summer apple varieties							
"Pervenets in Samarkand" (st)	83,8	4,6	6,3	100,0	3,7	18,3	100,0
"Oydin"	164,3	5,5	7,5	196,1	4,6	36,7	200,5
"Elena"	169,0	6,5	7,5	201,7	4,2	14,7	80,3
Qizil Janoqi	88,0	5,5	5,6	105,0	4,1	14,6	79,8
"Rustami"	174,9	6,2	7,5	208,7	4,5	39,6	216,4
Mantet	80,8	5,2	6,2	96,4	4,5	17,4	95,1
Stark Erlist	104,5	5,5	6,9	124,7	4,5	16,8	91,8
Williams Pride	208,5	6,7	8,2	248,8	4,5	27,2	148,6
Pristine	112,5	5,5	7,2	134,3	3,8	12,9	70,5
Dayton	231,3	7,5	8,9	276,0	4,6	32,9	179,8
Vadimovka	236,9	7,2	8,9	282,7	4,5	34,9	190,7

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EKF _{0.5}	0,7	0,3	0,3	-	-	0,4	-
Sx	0,12	0,05	0,04	-	-	0,06	-
Early autumn apple varieties							
Red Delishes (st)	169,8	7,9	7,2	100,0	4,4	16,6	100,0
Renda	124,5	6,5	6,1	73,3	3,9	18,6	112,0
Candil Sinap	126,8	7,33	6,30	74,7	4,3	7,7	46,4
"Bolajon"	58,4	4,5	4,4	34,4	4,0	18,3	110,2
"Israel"	275,3	8,7	10,6	162,1	4,7	30,9	186,1
"Farangiz"	206,2	7,8	7,2	121,4	4,6	14,9	89,7
Prikubanskoe	265,5	7,5	8,7	156,4	4,5	39,9	240,4
Starking Delights	124,6	4,8	6,6	73,4	4,3	31,0	186,7
Limonniy	119,5	6,2	5,7	70,4	4,2	13,9	83,7
Renora Zimnyaya	184,8	6,3	7,4	108,8	4,6	24,9	150,0
Remo	155,9	6,6	7,3	91,8	4,5	20,3	122,3
Sunprice	130,8	5,8	7,1	77,0	4,5	33,3	200,6
Liberty Zimni	170,3	5,8	7,4	100,3	4,4	27,3	164,4
Wagner prizovoe	305,5	7,0	9,5	179,9	4,5	29,3	176,5
II-X-31	249,5	7,9	9,9	146,9	4,5	28,7	172,9
II-X-11	250,3	8,6	8,2	147,4	4,6	29,8	179,5
EKF _{0.5}	0,4	0,3	0,2	-	-	0,3	-
Sx	0,08	0,05	0,04	-	-	0,05	-
Autumn apple varieties							
King David (st)	185,6	7,5	7,5	100,0	4,4	36,5	100,0
Kubanskaya bagrennaya	259,9	6,4	8,8	140,0	4,6	37,8	103,6
Pamyat Esaulu	254,7	6,7	8,4	137,2	4,7	21,0	57,5
Florina	194,5	5,7	7,6	104,8	4,5	35,2	96,4
EKF _{0.5}	0,7	0,2	0,1	-	-	0,5	-
Sx	0,11	0,03	0,02	-	-	0,07	-
Winter apple varieties							
"Nafis" (st)	248,9	7,5	8,3	100,0	4,1	38,4	100,0
Fuji	193,4	6,3	7,4	77,7	4,6	18,6	48,4
Mutsu	285,9	7,8	8,6	114,9	4,8	20,4	53,1
Goldrush	128,3	5,7	6,4	51,5	4,5	35,5	92,4
EKF _{0.5}	0,7	0,1	0,1	-	-	0,3	-
Sx	0,10	0,01	0,02	-	-	0,04	-

The size of fruits of autumn varieties is large in King David (st) (185.6 g) and Florina (194.5 g), and in Kubanskaya bagrennaya (259.9 g) and Pamyat Esaulu (254.7 g) varieties it is found to be very large. According to the results of fruit tasting, autumn varieties were rated with 4.5-4.7 points higher than the standard variety. In autumn varieties, the yield from one tree was the highest in the Kubanskaya bagrennaya variety (37.8 kg), and the lowest in the Pamyat Esaulu variety (21.0 kg). The fruits of the winter Mutsu variety were very large, with an average weight of 285.9 g. The fruits of this variety were given the highest 4.8 points. The size of Fuji (193.4 g) fruits

is large, and the fruits of this variety were rated high (4.6 points). In terms of productivity, the highest indicator (38.4 kg.) was recorded in the "Nafis" (st) variety, and the lowest (18.6 kg.) productivity was recorded in the Fuji variety, which prevailed in terms of fruit quality indicators, compared to the standard variety.

Based on the results of the research, the morphological and economic characteristics of the growth and development of local and introduced varieties of apple grown on low grafts were evaluated and the following were concluded. In order to expand the regional assortment of apple trees in the republic, it is necessary to comprehensively evaluate new and

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promising varieties, which will allow to create intensive orchards from varieties that are characterized by the fastest adaptation, productive, high-quality fruits, average growth rate.

According to the height of the trees and the diameter of the branches, the summer Kizil Janoqi, Mantet, Stark Erlist, Pristin, Dayton and Vadimovka, early autumn Renda, Kandil Sinap, "Farangiz", Starking Delishes, Renora Zimnyaya, Remo, Wagnera prizovoe, autumn Pamyat Esaulu, winter Fuji and Goldrash varieties were distinguished from other varieties by the average growth of their trees.

According to the marketability of the studied

varieties, summer "Oydin", "Rustamiy", Williams Pride, Dayton and Vadimovka, early autumn "Israel", Prikubanskoe, Wagnera prizovoe varieties and hybrids II-X-31, II-X-11, autumn Kubanskaya Bagrennaya, Pamyat Esaulu, Florina, Winter Fuji, and Mutsu varieties were distinguished from other varieties by the average fruit weight and high tasting value.

The highest yields are summer "Oydin", "Rustamiy", Williams Pride, Dayton and Vadimovka, early autumn "Israel", Prikubanskoe, Sunprice, Wagnera prizovoe varieties and II-X-31, II-X-11 hybrids, autumn Kubanskaya bagrennaya, Florina was noted in winter Goldrash varieties.

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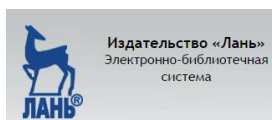
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