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Boltayev Nurali Shiramatovich

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MECHANISMS FOR ENSURING ALIGNMENT BETWEEN LABOUR MARKET DEMAND AND THE WORKFORCE TRAINING SYSTEM IN THE AGRICULTURAL SECTOR

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Abstract: This article investigates the theoretical and practical aspects of ensuring alignment between labor market demand and the personnel training system in the agricultural sector. It analyzes the need for new professional competencies emerging in the labor market as a result of modern development trends in the agricultural sector, digitalization, the introduction of innovative technologies, and the modernization of production processes. The article examines the alignment of personnel training in the agricultural sector with labor market requirements, the improvement of educational programs based on employers' demands, the employment rates of graduates in agricultural fields, and wage levels across sectors. Proposals and recommendations are developed for the practical implementation of advanced international experience.

Keywords: agricultural sector, labor market, personnel training, labor market demand, alignment, professional competence, education and production integration, human resource potential, employment, labor resources, digitalization, innovative technologies.

Аннотация: В статье исследуются теоретические и практические аспекты обеспечения соответствия между спросом на рынке труда и системой подготовки кадров в аграрной сфере. Проанализирована потребность в новых профессиональных компетенциях, формирующаяся на рынке труда в результате современных тенденций развития аграрной сферы, цифровизации, внедрения инновационных технологий и модернизации производственных процессов. Рассмотрены вопросы согласования подготовки кадров в аграрной сфере с требованиями рынка труда, совершенствования образовательных программ с учётом требований работодателей, показатели трудоустройства выпускников сельскохозяйственных направлений и уровень заработной платы по отраслям. Разработаны предложения и рекомендации по внедрению передового зарубежного опыта в практику.

Ключевые слова: аграрная сфера, рынок труда, подготовка кадров, спрос на рынке труда, соответствие, профессиональная компетенция, интеграция образования и производства, кадровый потенциал, занятость, трудовые ресурсы, цифровизация, инновационные технологии.

INTRODUCTION

The economic significance of workforce training within the global higher education system is reflected in its contribution to the development of human capital and, consequently, to enhancing the growth, efficiency, and competitiveness of national economies. This process is regarded as an investment in human capital, as highly qualified professionals play a crucial role in determining a country's socio-economic development. The introduction and advancement of new technologies in production processes, as well as the achievement of economic growth across various sectors of the economy, require labour resources with appropriate qualifications, skills, and practical experience. Therefore, ensuring that the knowledge and competencies acquired through higher education correspond to the evolving requirements of the labour market is of particular importance.

According to the World Bank and the Organization for Economic Cooperation and Development, the contribution of higher education graduates to the economy is the highest, averaging 17%. This provides an increase in income (compared to 10% in primary education and 7% in secondary education)[1]. The main aspects of training in the higher education system are ensuring the personal income and employment of graduates in the labor market, national economic growth, for example, in the agricultural sector, qualified personnel increase productivity, introduce innovations and ensure technological development. That is, personnel with modern knowledge The economy can quickly implement innovations, effectively use IT, biotechnology, and green energy.

At the same time, entrepreneurship develops in society, tax revenues increase, and sustainable development, social stability, and global competitiveness are ensured. As a result, this system is the main mechanism for the development of not only personal well-being, but also the entire society and the state economy.

As a result of the current development process of the Republic of Uzbekistan and the rapid reforms being carried out in each sector, strategic changes are being implemented aimed at increasing the well-being of the population. In particular, in 2025, the gross domestic product (GDP) of the Republic of Uzbekistan amounted to 1849,7 trillion soums at current prices, and the real growth rate compared to the corresponding period in 2024 was 7,7 %. The role of young people who can use the existing resource potential and acquire modern knowledge is invaluable in achieving such positive results. At the same time, minor changes were observed in the structure of GDP in 2025. Compared to the corresponding period in 2024, the share of the services sector in the structure of GDP (GDP) increased from 48,2% to 48,6%, the share of industry from 26,1% to 26,8%, and the share of construction from 7,2% to 7,3%. At the same time, the share of agriculture, forestry and fisheries decreased from 18,5% to 17,3%. That is, high growth rates were recorded in the economy of our republic. As a result of the rapid development of other sectors, the development of the agricultural sector, which we are studying, has led to a decrease in the structure of GDP. However, the volume of agricultural products produced in the agricultural sector in 2025 amounted to 508711,1 billion soums, or 104,4% compared to 2024, including agricultural products - 243007,7 billion soums (107,2%), livestock products – 265703,4 billion soums (101,6%). By region, the highest volume of agricultural products was recorded in Samarkand (57963,3 billion soums), Andijan (50263,3 billion soums), Kashkadarya (49950,0 billion soums) and Tashkent (48794,1 billion soums) regions¹.

REVIEW OF LITERATURE ON THE SUBJECT

Under the conditions of Uzbekistan, there is considerable potential to improve the efficiency of the workforce training system in the agricultural sector by developing it through market mechanisms based on labour market supply and demand, strengthening the integration of education, science, and production, and adopting international best practices. As a result, the agricultural sector can function not only as a provider of food security but also as a key driver of national economic growth. Therefore, numerous scholars have conducted research on the economic significance of workforce training in the agricultural sector and have expressed their views on this issue. Among them is Theodore W. Schultz, an American economist and recipient of the 1979 Nobel Prize in Economic Sciences. He emphasized that investment in human capital - including education, skills, and health - is a key factor in the modernization of agriculture. According to Schultz, investment in human capital is essential for promoting economic growth and reducing poverty in the agricultural sector [2].

Gary S. Becker (American economist, one of the founders of human capital theory): Investment in human capital (education and training) works like physical capital in business and increases returns in agriculture. He emphasized that skilled personnel reduce costs and increase efficiency[3]. This theory proved the economic profitability of education in the agricultural sector with figures.

Also, Wallace E. Huffman (American economist, modern researcher): Agricultural education directly affects agricultural growth. He noted that the development of the agricultural education system and the training of qualified personnel can increase productivity by 10–30%[5].

Lorena C. Espina-Romero et al. conducted a study on the interest of employees in each sector in learning soft skills (i.e., skills that are necessary for success in any job). In this study, 753 publications related to soft skills in personnel training in the Scopus database were analyzed from 1999 to 2021. These documents, in their main data, proposed their own approaches to setting the future agenda, implementing prospective plans, and analyzing current results in the most studied areas[5]. Of course, the specific characteristics of personnel training in the agricultural sector require taking into account natural factors related to land and water, environmental protection, and the efficient use of limited resource potential.

W. Wenjie and AAKurbanbaeva conducted research on the issue of personnel management strategy in agricultural enterprises, covering various aspects, including the use of modern technologies in recruiting and selecting employees, training and developing them, motivating and retaining employees, as well as specialization taking into account their specific characteristics. In this regard, they substantiated the need to solve problems related to labor relations and socio-cultural aspects, ensure safety and working conditions, and create a comfortable working environment[6]. In our opinion, it is necessary to teach subjects such as modern management methods, labor relations, and digitalization in higher education and vocational education institutions that train personnel for the agricultural sector in our republic. That is, in order to ensure the implementation of the assigned tasks, employees should adhere to a culture of dialogue when interacting with each other.

¹ Data from the National Statistics Committee of the Republic of Uzbekistan.

Scientists of our republic A.J.Toshboyev, Z.T.Siddikov, N.Sh.Boltayev emphasized that the sustainable development of Uzbekistan and the implementation of reforms in the agrarian sector and the achievement of the expected results directly depend on the professional staff that makes up these processes, that is, achieving high results in the agrarian sector requires high knowledge, potential and professional skills from specialist personnel[7]. In this case, if the employment rate of graduates of the Tashkent State Agrarian University, which trains personnel for the agrarian sector, was determined as a result, then factors that indirectly affect its change were taken into account, such as the scientific potential of professors and teachers, the cooperation of the institution where the graduate is being trained with employers, the level of scientific research in the educational institution, the compatibility of education with international experience, and the level of introduction of digital technologies into the educational process[8]. Also, as a result of these factors, prospects for the development of qualified personnel training were determined.

U. Beglayev et al. have highlighted the prospects and problems of distance education in the field of agribusiness and e-commerce[8]. Medium-term forecast indicators of the employment rate of distance education graduates in a number of areas of agribusiness and e-commerce in 2024-2030 have been developed. In this work, the main aspects of the development of distance education in agribusiness, as well as the directions of e-commerce, are highlighted, and the issues of using digital technologies in the provision of modern educational services are discussed.

The opinions expressed by these economists indicate that today, in order to achieve economic growth in the economy of countries, especially in the agricultural sector, it is necessary to train qualified personnel. Because qualified personnel are one of the main factors of agricultural efficiency, productivity, innovation and overall economic growth. This process is important for the sustainable development of the national economy of Uzbekistan.

RESEARCH METHODOLOGY

Methods widely used in scientific research methodology were used in the implementation of this research work. To analyze the mechanisms for ensuring the balance between labor market demand and the personnel training system in the agricultural sector, methods of logical thinking, scientific abstraction, information grouping, analysis and synthesis, and induction and deduction were used.

ANALYSIS AND RESULTS

Training competitive personnel in the labor market requires a comprehensive analysis of the educational process, automation of educational management using modern information and communication technologies, ensuring transparency of the results of the educational institution's activities, effective use of labor resources and saving financial resources. In the process of analyzing the labor market in the agricultural sector, a consistent increase in the number of labor resources in Uzbekistan was observed under the influence of general demographic growth, urbanization processes and economic reforms. As of January 1, 2026, the permanent population of the Republic of Uzbekistan amounted to 38236,7 thousand people, an increase of 1,8% compared to the same period last year. According to the National Statistics Committee, in 2010 the number of labor resources was 16726 thousand people, while by 2025 this figure had reached 21352,1 thousand people, or an increase of 127% (Figure 1).

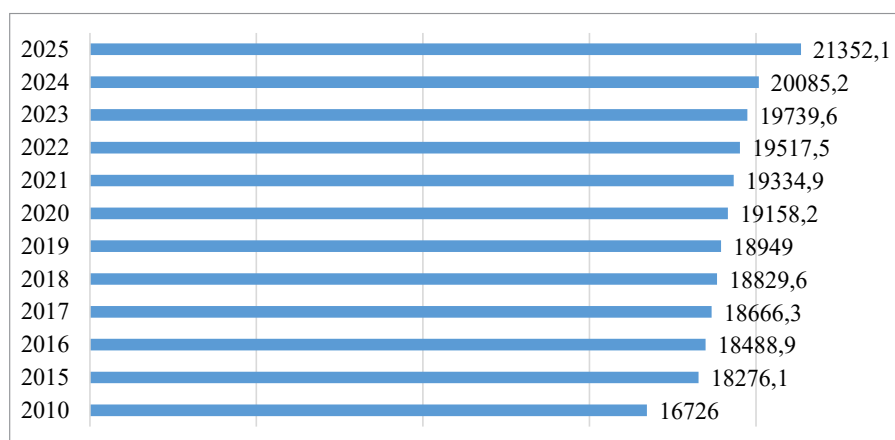


Figure 1. The number of labor resources in the Republic of Uzbekistan²

² Prepared based on data from the National Statistics Committee of the Republic of Uzbekistan

During 2010-2025, the number of labor resources in Uzbekistan generally had a stable growth trend, and short-term declines were mainly associated with external factors. At the same time, the decreasing share of labor resources in the population indicates the need for effective management of the labor market, personnel training and improvement of employment policy in the future. Based on this situation, it is necessary to analyze the number of people employed in the agricultural sector today, and determine measures to implement priority tasks, such as implementing mechanisms to increase the attractiveness of this sector. Because the experience of developed countries shows that young people are mainly engaged in IT, economics, services, and tourism. This situation will lead to an increase in the need for personnel in agriculture in the future. Also, 49% of the country's population lives in rural areas. Therefore, agriculture is of great importance for the economy of Uzbekistan and the well-being of its population. Agriculture accounts for about one-fifth of the country's gross domestic product. Agriculture is not only a food production sector, but also the economic backbone of many villages and small towns across the country, as in some areas there are no alternative sources of income other than agriculture. This creates a large workforce for labor-intensive agricultural activities and processing of agricultural products.

From the analytical data it can be seen that, although the number of labor resources employed in the agricultural sector has increased in quantity as a result of structural changes in the republic's economy, it is decreasing in share due to the rapid development of industry and service sectors. Several other reasons can be cited for this, including the industrialization of our country, the decrease in the share of manual labor, the replacement of the human factor by machinery, the lack of opportunities to create new additional jobs, the seasonality of the agricultural sector by its nature, and the influence of natural factors. Also, out of the total number of employed people in the economy, more than 14 million people are employed, of which the share of agriculture, forestry and fisheries is more than 3 million or 22%. (Table 1).

Table 1

Distribution of positions by type of economic activity (thousands, people)³

No.	Types of economic activities	2010	2015	2020	2023	2024	2025	In 2025 compared to 2010 (%)
	Total	11628,4	13058,3	13236,4	14014,2	14261,9	14141,7	
1	Agriculture, forestry and fisheries	3118,1	3601,7	3499,2	3344	3240,7	3120,5	100,1
2	Mining and open pit mining	121,4	130,3	92,5	58,9	63,2	63,2	52,1
3	Manufacturing industry	1339,1	1476,2	1597,7	1661,9	1548,3	1548,3	115,6
4	Electricity, gas, steam and air conditioning supply	86,9	99,1	72,3	68,6	68,1	68,1	78,4
5	Water supply; sewage system, waste collection and disposal	58,3	63,1	47	46,5	49,7	49,7	85,2
6	Construction	1033,7	1222,2	1305,6	1502,2	1360,1	1360,1	131,6
7	Wholesale and retail trade; repair of motor vehicles and motorcycles	1235,6	1413,8	1405,4	1586,1	1504,8	1504,8	121,8
8	Transportation and storage	509,9	614,7	610,5	640,4	601,5	601,5	118,0
9	Accommodation and catering services	249,2	297,3	302,8	367,2	363,5	363,5	145,9
10	Information and communication	53,1	61,7	58,7	87,8	98,6	98,6	185,7
11	Financial and insurance activities	69,9	69,8	72,5	73,4	79	79	113,0
12	Real estate transactions	62,1	68,1	53,4	64,9	63,2	63,2	101,8
13	Professional, scientific and technical activities	135,8	131	131,6	139,2	144,4	144,4	106,3
14	Management activities and provision of support services	64	71,4	98,4	108,7	107,5	107,5	168,0
15	Public administration and defense; compulsory social security	584,6	598,1	635,9	637,9	634,9	634,9	108,6
16	Education	1102	1105,3	1158,2	1299,5	1320,2	1320,2	119,8
17	Health and social services provision	596,2	601,5	669,5	694,8	695,2	695,2	116,6
18	Arts, entertainment and recreation	64,4	65	67	71,9	66,6	66,6	103,4
19	Providing other types of services	1144,1	1368	1358,2	1560,3	2252,4	2252,4	196,9

3 Prepared based on data from the National Statistics Committee of the Republic of Uzbekistan.

In recent years, systematic work has been carried out to create comprehensive opportunities for supporting young people and further increase their social activity, ensure employment and increase their income by involving them in the agricultural sector. In particular, 60,5 thousand hectares of land close to their places of residence and with good water supply have been selected, 192 thousand lots have been developed on the selected land plots and allocated to 171 thousand young people included in the list formed on the recommendation of the “neighborhood seven” through the “E-auction” electronic trading platform. According to the National Statistics Committee, in 2025, a total of 424840 enterprises and organizations operate (by economic sector), of which 30952 (7,3%) enterprises and organizations operate in the agricultural, forestry and fisheries sectors. This, in turn, will create new job opportunities and increase the demand for qualified personnel in this sector. To this end, higher education institutions should identify priority areas for training personnel in high demand in the labor market.

In our opinion, positive changes are being achieved as a result of state support for the agricultural sector. Further improvement of these achieved results will depend on the personnel being trained in higher education institutions in the effective use of resource potential. Because the concept of “Human resources solve everything” has not lost its importance and relevance. Through the development of human capital, it is possible to improve society and ensure the well-being of the population. Therefore, it is necessary to explain to young people how important the agricultural sector is. Based on the characteristics of the labor market in the agricultural and food sector, we will list the main influencing factors (Figure 2).

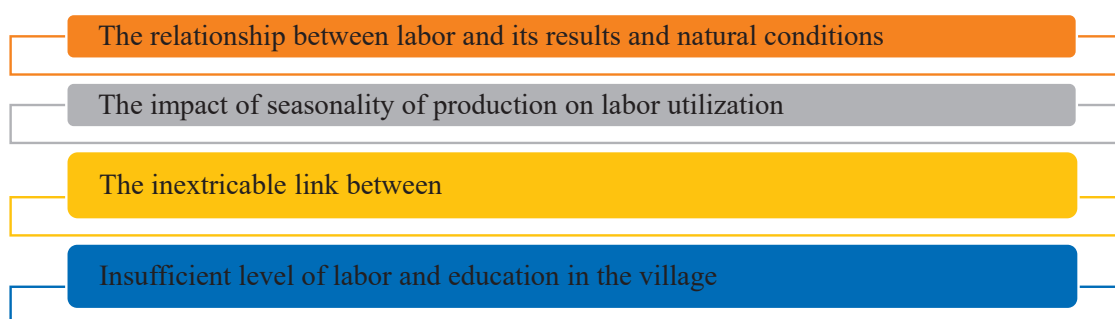


Figure 2 Main influencing factors in the agricultural and food sector based on labor market characteristics⁴

These influencing factors have their own characteristics in the agricultural labor market, the leading seasonality factor, the low level of mechanization of labor, territorial differences (differences between rural and urban areas) directly affect the distribution of labor in the production and service provision process. Also, the relatively low level of wages and difficult working conditions cause qualified personnel to leave for other sectors. In particular, the demand for labor in the agricultural sector is increasing year by year even in developed countries. In addition, demographic factors, the level of education and professional training also play an important role in the formation of the labor market.

In our opinion, the increase in the number of economic entities and the expansion of cultivated areas in the agricultural sector requires the modernization of the personnel training system, the development of practice-oriented education, and the strengthening of the integration of education with production (Table 2).

Table 2

Analysis of the balance between the labor market and personnel training in the agricultural sector⁵

No.	Indicators	Labor market situation	Staff training status	Proportionality level	Problem	Offers
1	Farms (91712 units)	High demand (agronomist, mechanist, manager)	Theoretical knowledge is superior, practice is not enough	Medium	Lack of practical skills	Expanding dual education and internships
2	Farms (2222)	Low demand, but mass employment	Short courses are rarely organized	Low	The level of education of the population is low.	Short-term training courses

⁴ Prepared by the author based on information from the Ministry of Agriculture.

⁵ Developed based on the author's research.

3	Clusters (663)	Demand for highly qualified personnel (engineers, technologists)	Modern directions are limited	Medium	Lack of innovative knowledge	Strengthening IT and agrotechnology disciplines
4	Cooperatives (498 units)	Management and legal knowledge required	There is little education in this area.	Low	There is a shortage of cooperation specialists.	Implementation of special training programs
5	Cropland (large scale)	High demand for mechanization and water management personnel	There is a shortage of technical specialists.	Medium	Practical technical knowledge is lacking.	Development of colleges and technical schools
6	Rural population employment	There is excess labor resources.	Low career guidance	Low	Inappropriate employment	Vocational education and retraining

The analysis of Table 2 shows that there is no complete balance between the needs of the labor market and the personnel training system in the agricultural sector. Because the interest of young people in the agricultural sector and the level of activity in this sector is decreasing. Therefore, it is necessary to introduce attractive mechanisms for attracting them to the agricultural sector or to establish digitalization and production using the capabilities of artificial intelligence. In the experience of developed countries, the production of products in the agricultural sector is also increasing based on such principles. Another important aspect is that in developed countries, agriculture is developed with state support. In our republic, measures have been established to develop the sector. However, the implementation of these tasks will depend on the knowledge and experience of highly qualified personnel. Therefore, it is important to integrate the education system of personnel being trained in the agricultural sector with production, introduce dual education, and expand short-term vocational training programs.

During our research conducted today, the current situation was analyzed in order to identify and implement measures to improve the position of agricultural specialists in the labor market. It was noted that jobs are unstable (there are more than 30000 vacancies). We can also see that agricultural professions are not attractive to young people (Figure 3).

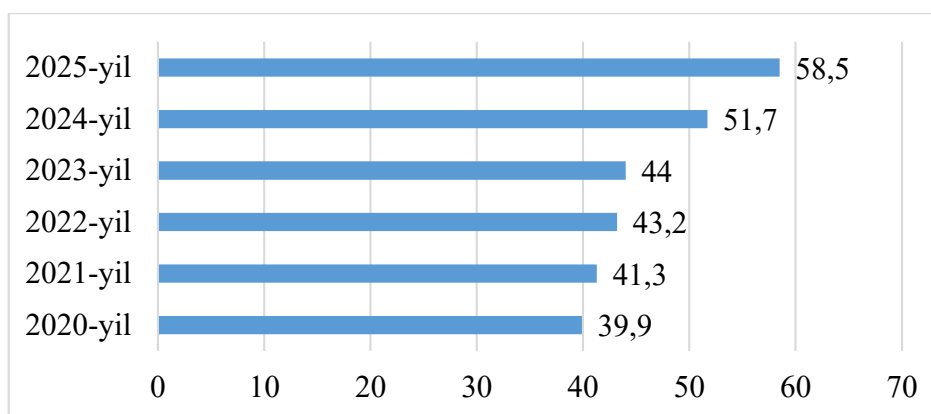


Figure 3. Employment rates of agricultural graduates (%)⁶

Based on the reforms being carried out in the agrarian sector and regional development programs, new jobs are being created in the regions due to the development of new lands and attraction of investments. Therefore, the indicators of young people graduating in agricultural fields in their specialty increased by 146% in 2025 compared to 2020. Another important aspect of the lack of work in the agricultural sector in their specialty can be explained by the low monthly salaries. Because, young people are increasingly interested in sectors with high monthly salaries in the economic sectors. The analysis of the level of wages by sector shows that the agricultural sector has the lowest indicator (Table 3).

⁶ Source: Prepared based on data from the Ministry of Agriculture.

Table 3
Salary levels by industry (2025)

No.	Industries	Salary (thousands of soums)
1	Finance and insurance	15987,6
2	Information and communication	12715,2
3	Manufacturing industry	6548, 2
4	Health and social services	3607, 8
5	Agriculture	3248, 1
6	Average salary in the republic	6551, 6

The labor market is characterized by high demand for agricultural jobs, but the average salary in our country is less than 50 percent. At the same time, according to the National Agency for Quality Assurance in Education, the total number of students has increased from 1,33 million to 1,62 million over the past 3 years . One of the main trends is that the social and humanitarian sciences category is the leading direction, its share has increased from 59% → 63%. The majority of students are studying in this area. The category of applied sciences has decreased, its share has decreased from 31% → 25%. Interest in technical and engineering fields is relatively decreasing. There has been a steady growth in the category of medical sciences , its share has increased from 7% → 9%. The category of creative (sports) sciences has remained unchanged, maintaining a stable share of 3%. The results of the analysis show that the dominance of humanitarian areas in the higher education system remains, and the share of engineering fields is decreasing⁷. In this situation, it is necessary to apply the best practices of foreign countries in providing the agricultural sector with qualified personnel. In particular:

In order to ensure youth employment in the agricultural sector, the South Korean government will allocate subsidies of up to \$3,8-15,0 thousand and provide tax incentives.

Germany has various programs for young people who want to work in agriculture or develop their own businesses in rural areas. Within the framework of these programs, subsidies and grants in the amount of 25-40 thousand euros will be allocated for 5 years.

The Chinese government will allocate up to \$1,4-7,0 thousand for working capital, as well as \$4,2-28,0 thousand in subsidies and grants for agrobiotechnology, sustainable agriculture, and smart agriculture to attract young people to rural areas.

As part of the US government's Farm to School program, farmers deliver agricultural products to schools at reduced prices. Schoolchildren visit farms and become more interested in the industry.

Based on these foreign experiences, we believe that it is appropriate to implement the following practical measures in the future process of training personnel in the agricultural sector:

- to encourage youth entrepreneurship in the agricultural sector and expand opportunities for young people, introduce the "Young Farmer" program (land allocation, lending, subsidies, etc.);
- to provide economic support to young people entering the industry, allocate a one-time "support fund" from the budget in the amount of 4 times the minimum wage;
- introduction of a system of incentives (exemption from land and property taxes, compensation of up to 50% on loan interest) for youth projects aimed at introducing modern agrotechnologies and innovative solutions into the agricultural sector ;
- providing subsidies in the amount of 4 times the minimum wage per month for each specialist for 2 years for enterprises, organizations and institutions that employ graduates.

Implementing these activities will help attract young people to the agricultural sector, eliminate the shortage of personnel in the sector, and further increase the level of use of land and water resources.

CONCLUSIONS AND SUGGESTIONS

The results of the study show that ensuring a balance between the demand for labor market and the personnel training system in the agricultural sector is one of the important conditions for the sustainable development of the industry, increasing labor productivity and forming competitive specialists. As a result of the widespread introduction of digital technologies, automation, artificial intelligence, modern agrotechnologies

⁷ Source: Prepared based on data from the National Agency for Education Quality Assurance.

and resource-saving technologies in agriculture, the requirements that employers place on specialists are also changing. That is, it is advisable to regularly monitor the employment of graduates and use the results obtained in determining the parameters of personnel training. Such an approach serves to reduce the imbalance between the number of specialists being trained in the education system and the real demand in the labor market.

In general, the effective integration of the labor market and personnel training system in the agricultural sector should be based on ensuring the continuity of “education - science - production - labor market”. This approach will expand the opportunities for the agricultural sector to train specialists with modern knowledge and practical skills, mastering digital and innovative technologies, and competing in the labor market.

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