WEST KAZAKHSTAN REGION

STAFFING ROADMAP

Ministry of Science and Higher Education of the Republic of Kazakhstan

West Kazakhstan Region Akimat

YEAR OF VOCATIONAL PROFESSIONS

WEST KAZAKHSTAN REGION ATLAS OF NEW PROFESSIONS AND COMPETENCIES

WEST KAZAKHSTAN REGION ATLAS OF NEW PROFESSIONS AND COMPETENCIES

WEST KAZAKHSTAN REGION ATLAS OF NEW PROFESSIONS AND COMPETENCIES

ABBREVIATIONS

“IT” – means information technologies

“STEM” – means science, technology, engineering and mathematics

“JSC” – means a joint stock company

“BNS ASPR RK” – means the Bureau of the National Statistics of the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan

“GDP” – means gross domestic product

“DRP” – means domestic regional product

“HEI” – means a higher education institution

“AI” – means artificial intelligence

“SME” – means small and medium enterprises

“NGO” – means Non-Government Organizations

“NCE” – means the National Chamber of Entrepreneurs

“FAS” – means faculty and academic staff

“VET” – means vocational education and training

“LLP” – means a limited liability partnership

“LFDC” – means Labor Force Development Center

Turegaliev Nariman Turegaliyevich

Akim of the West Kazakhstan Region

Dear colleagues,

The modern labor market is undergoing a major transformation under the influence of technological progress, digitalization, and changes in production processes. These trends directly affect the economic development of regions, establishing new requirements for personnel qualifications. Therefore, the creation of an Atlas of New Professions and Competencies for the West Kazakhstan Region is a timely and strategically important task for the region.

The work on the Atlas included a comprehensive analysis of the social and economic situation, professional diagnostics of students, and interviews with representatives of business, the social sphere, and government agencies.

The Atlas covers six priority sectors of the region, identifying new, transforming, disappearing, and acutely shortage professions for each sector.

The provided data demonstrates a significant transformation of the regional labor market driven by digitalization, automation, and the implementation of environmentally friendly and resource-saving technologies. It is becoming clear that the coming years will be an increasing demand for IT specialists, technologists, automation engineers, environmental specialists, logistics specialists, service specialists, and digital production support specialists.

It is important to note that the development of human capital is a central prerequisite for the sustainable growth of the West Kazakhstan Region. Training personnel for priority sectors is impossible without close cooperation with employers, educational institutions, and the expert community. The Atlas of New Professions is intended to become a key tool ensuring such coordination.

I am confident, that the using of the Atlas of New Professions and Competencies will be an important step towards forming a strong human resource and sustainable economic development of the West Kazakhstan region.

I wish all Atlas users success in professional endeavors and express my gratitude for desire to working for the benefit of the region!

Nurbek Sayasat

Minister of Science and Higher Education of the Republic of Kazakhstan

Dear friends,

I am pleased to welcome you on the pages of this magazine and take this opportunity to discuss one of the most important tasks facing the region: creation of a Regional Staffing Roadmap.

This tool will play a key role in training specialists constituting the basis for the sustainable development of the West Kazakhstan Region.

The President Kassym-Jomart Kemelevich Tokayev has declared 2025 the Year of Vocational Professions which once again evidences the growing importance of vocational occupations for our country's economy.

The creation of a Regional Staffing Roadmap is a strategic step that will allow us to form a sturdy base for economic growth and prosperity in the West Kazakhstan Region.

The Regional Staffing Roadmap will allow us to understand better the professions that will be in demand in the coming years and to focus our efforts to train specialists for priority industries.

Several core economic sectors are particularly relevant for the region: manufacturing, mining, construction, transport and warehousing, agriculture, forestry and fisheries, and education. More than 120 experts from major enterprises and institutions of the region participated in foresight- sessions in order to analyze priority industries.

Students of 264 regional schools underwent a career diagnostics, covering a total of more than 8,000 schoolchildren.

The Regional Staffing Roadmap will help us plan educational programs more accurately, adapt the vocational training system and the higher education system, and provide highly qualified personnel to those industries that are most important for the region's economic growth.

The regional map will help high school students and their parents make informed career choices. In conclusion, I would like to say that we are facing a daunting task: to prepare highly qualified personnel for the future.

We must work proactively to provide the West Kazakhstan Region with personnel who will build the economy of tomorrow. Thank you for your attention, and I wish you success in this important endeavor!

Sergaliev Nurlan Habibullovich

Chairman of the Management Board - Rector of M.Utemissov West Kazakhstan University

Dear friends, colleagues, partners, representatives of business and education, and respected youth of the West Kazakhstan Region,

Today we are on the cusp of a new era when rapid technological development, digitalization and global changes shape a completely different image of professions and competencies. That is why the creation of the Atlas of New Professions and Competencies of the West Kazakhstan Region, prepared with the support of the Ministry of Science and Higher Education of the Republic of Kazakhstan and the Akimat of the West Kazakhstan Region as a part of the Regional Staffing Roadmap under the Mamandygym – Bolashagym Project (My Profession is My Future Project), has become an important step towards understanding the future of our region.

Mahambet Utemissov West Kazakhstan University was honored to take an active part in this substaintial project. We held foresight-sessions where, together with experts and representatives of business, local executive bodies, the education system, and industry associations, we discussed "the concept of tomorrow", i.e., what the labor market will look like, what professions will emerge, and which ones will change. In-depth interviews helped us identify real trends and expectations and understand what knowledge, skills, and competencies will ensure success for young professionals.

This Atlas is not just an analytical document. It is a guide to the future, a reference point for those who want to build their careers consciously, a tool for educational institutions to update their curricula, and an opportunity for businesses to see what kind of personnel will be in demand in the immediate future.

We believe that the knowledge resulting from the dialogue among science, education, and practice will become the foundation for the sustainable development of the region. After all, by shaping a modern training system, we are shaping innovative, competitive and humanistic future of the West Kazakhstan Region.

May this Atlas inspire us all with new ideas, open up new horizons of opportunities, and become a symbol of progress towards a society where education and work are united by a common goal of building the future!

TABLE OF CONTENTS

INTRODUCTION

I.1. Foresight – Looking into the Future

The Atlas of New Professions and Competencies of the West Kazakhstan Region is a strategic tool aimed at forming a balanced and future-oriented model for the region's labor market. It reflects key transformations in the economy, social sphere, and education system, helping to identify the most significant trends, new and transforming professions, as well as a set of relevant skills and competencies that will be needed in the next 5–10 years.

The Atlas is based on the foresight methodology, a modern forecasting tool that allows for shaping industry development scenarios and identification of promising technologies and professions based on expert assessments. The study draws on the opinions of the representatives of business, education, government agencies, and industry experts, ensuring a comprehensive and practice-oriented analysis.

The Atlas focuses on six key sectors of the economy of the West Kazakhstan Region that has high potential for sustainable growth and influence the formation of the regional labor market:

1. **Mining and quarrying**
2. **Manufacturing**
3. **Construction**
4. **Transport and warehousing**
5. **Agriculture, forestry, and fisheries**
6. **Education**

These sectors have been identified as high priority ones due to their significant contribution to the economy and high demand for skilled personnel. Each of them is undergoing major changes related to digital transformation, the introduction of automation, artificial intelligence, green and resource-saving technologies, all creating demand for new skills.

The main objectives of the Atlas are as follows:

- to identify new, transforming, and disappearing professions in key economic sectors of the region;
- to support career guidance for schoolchildren and students by understanding their interests and the current labor market needs;
- to promote the modernization of educational programs, taking into account future staffing needs;
- to provide employers with information on the skills most in demand in the medium and long term.

The Atlas serves as a guide for students, teachers, parents, educational institutions, and employers, allowing them to adapt educational trajectories and staffing strategies to the demands of the new economy. This ensures that school and university students can plan their career paths more consciously, avoid choosing outdated professions, and master the skills that are highly sought-after.

The Atlas results from an extensive research:

- 35 in-depth interviews with industry experts;
- surveys of 417 representatives of the education sector;
- surveys of 205 business representatives;
- surveys of 408 residents of the West Kazakhstan Region;
- participation of 129 experts in foresight sessions.

As a result of this work, the following professions were identified:

- 92 new professions;
- 50 transforming professions;
- 44 disappearing professions;
- 62 critically shortage professions.

The data obtained provide an analytical basis for the strategic development of industries in the West Kazakhstan Region and the formation of manpower policy for the coming years.

I.2. Navigating the Atlas

The Atlas introduction outlines its objectives, target audience, and briefly describes the practical significance of the document. It presents the region's achievements, existing challenges, and prospects in the field of education and training in key sectors of the economy.

Special attention is paid to the trends shaping the labor market of the future. The changes in the following six high priority sectors are analyzed: industry, agriculture, forestry and fisheries, construction, transport and warehousing, and education. A separate section reflects the opinions of business representatives, educators, and residents of the region about the future and their readiness for changes.

A catalogue of new, transforming, disappearing, and critically shortage professions, as well as a description of the competencies required of specialists in the next 5–10 years are key elements of the Atlas. The final sections are devoted to career guidance opportunities through ProfWise.kz digital platform, as well as practical recommendations for schoolchildren on choosing educational paths, taking into account the future needs of the labor market.

I.3. Why and Who needs the Atlas of New Professions and Competencies of West Kazakhstan Region

The Atlas of New Professions and Competencies in West Kazakhstan Region is a strategic tool intended for a wide range of users.

It is a guide for schoolchildren and students to choose a future profession, pointing to the most promising areas of development for the region's economy.

The Atlas constitutes the basis of curricula update and modernization by educational institutions in line with current labor market demands.

For teachers, it is a practical guide that allows them to improve the quality of teaching and adapt the educational process to modern professional requirements. It reflects key trends in the development of industries, which helps adjust the content of programs and develop the necessary skills in students. The Atlas is also a career guidance tool that supports teachers in advising students on choosing a career path.

Employers gain access to information about sought-after skills and future staffing needs, which contributes to effective business planning and development.

For government agencies, Atlas serves as an analytical basis for shaping employment and education policies aimed at developing human capital and strengthening the region's competitiveness.

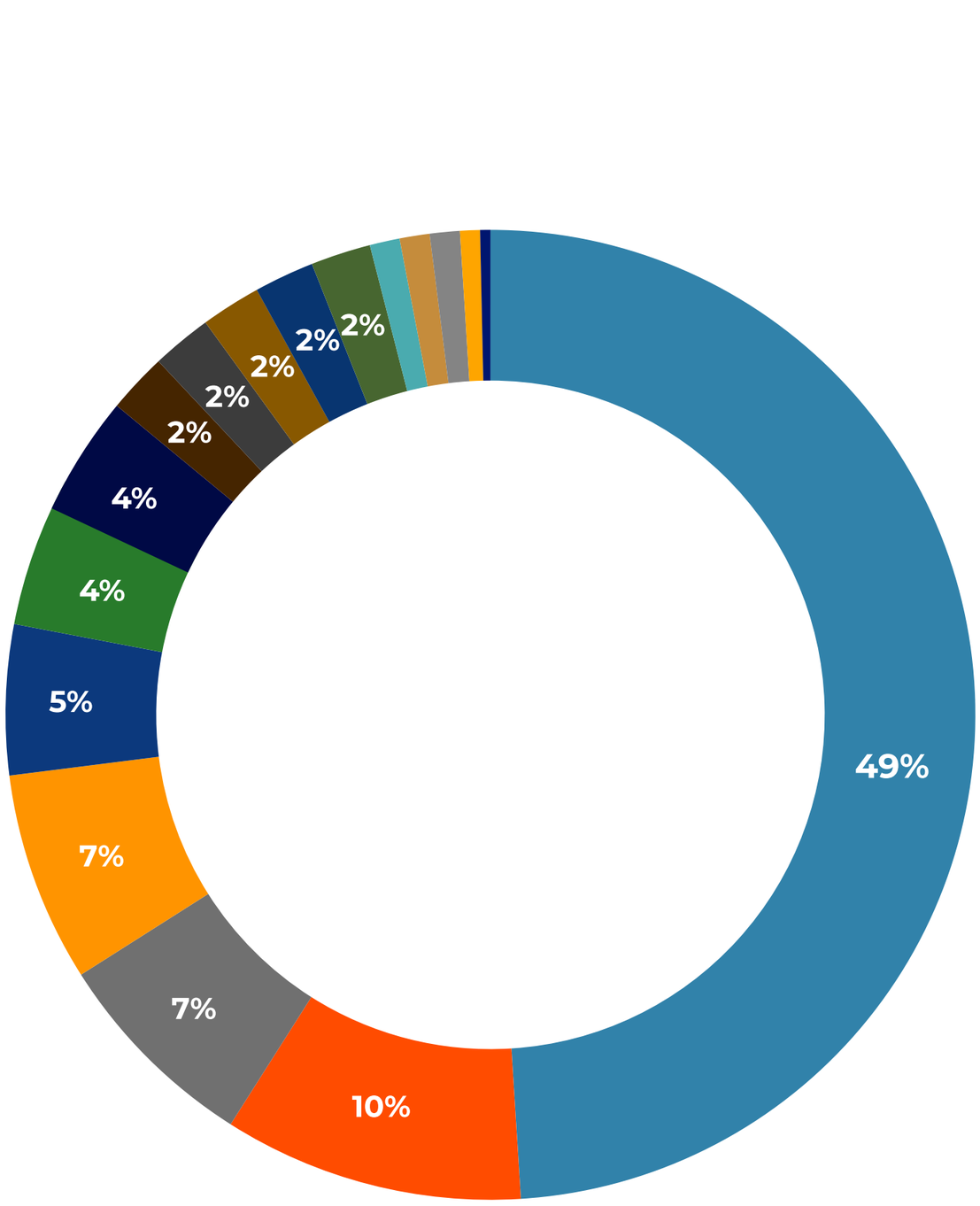
OVERVIEW OF THE REGION'S ACHIEVEMENTS AND PROSPECTS

II.1. Regional Economy

The West Kazakhstan Region is undergoing an important stage of economic transformation, combining its traditional raw material base with a growing non-resource-based sector. The region retains its status as one of the country's key industrial clusters, relying on the oil and gas complex, but at the same time is demonstrating a confident move towards diversification through the expansion of processing, the development of construction, services, trade, and the agricultural sector. Over the past decade, investment activity has intensified, fixed assets have been modernized, housing conditions have improved, and the labor market has become more stable and flexible.

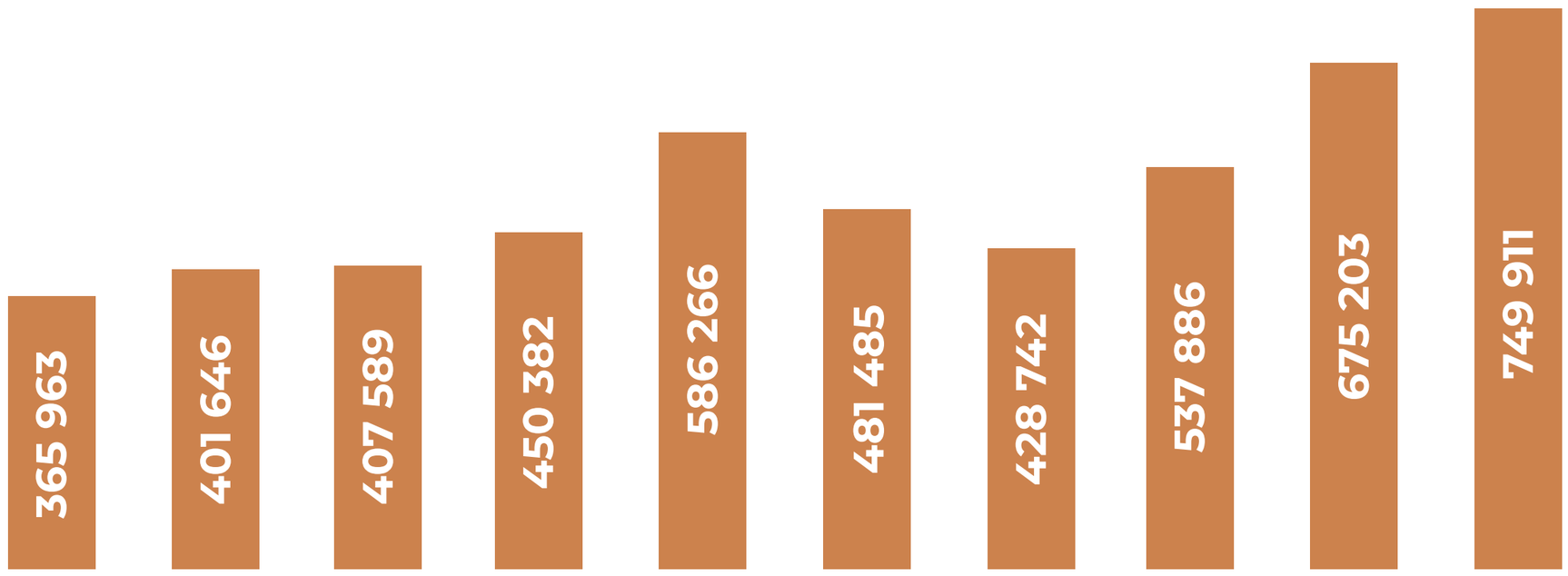
The regional economy manifests stable dynamics. In 2024, GRP amounted to approximately 4.7 trillion tenge, which corresponds to 3.5% of Kazakhstan's GDP. Despite periodic fluctuations related to global oil prices and reduced production, the non-resource-based sector continued to grow, ensuring the region's structural stability. During 2015 and 2024, investment in fixed capital grew significantly, especially in construction, manufacturing, and housing. Thanks to the construction boom, investment in housing increased almost five-fold, which made it possible to renovate the urban housing stock and improve living conditions in Uralsk and a number of regional centers.

Structure of GRP of West Kazakhstan Region in 2024



- Industry - 49%
- Wholsale and retail; vehicles and motor bikes repairing - 10%
- Real estate transactions - 7%
- Construction - 7%
- Education - 5%
- Transport and Warehousing - 4%
- Agriculture, forestry and fisheries - 4%
- Public administration and defense; mandatory social security - 2%
- Healthcare and social services to the population - 2%
- Professional, scientific and technical activities - 2%
- Activities in the sphere of administrative and auxiliary services - 2%
- Taxes on products - 2%
- Financial activities and insurance - 1%
- Other services - 1%
- Accommodation and caterign services - 1%
- Information and communication - 0,6%
- Art, entertainment and recreation - 0,4%

Dynamics of Investment in Fixed Capital in West Kazakhstan Region for 2015-2024, in KZT million



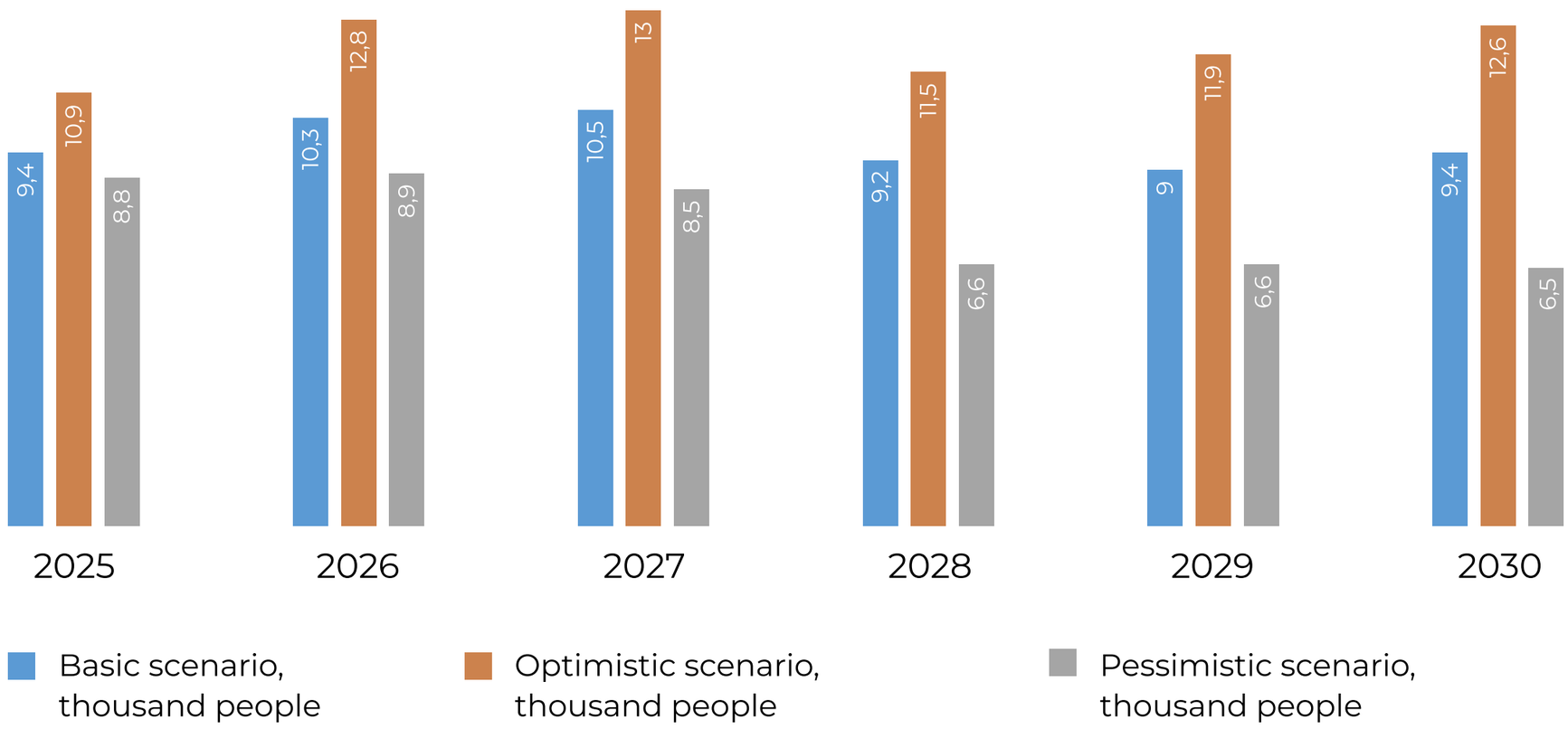
The region's demographic dynamics also reflects the current economic changes. The region's population grew by 9.7% between 2015 and 2024, but this growth was almost exclusively due to Uralsk, which is strengthening its role as a center of attraction for migrants and economic activity. Rural areas, on the contrary, are losing residents, which highlights the growing urbanisation. At the same time, the population is ageing: the proportion of elderly people is increasing, while the working-age population is gradually declining, which will require a more active personnel policy and modernisation of social infrastructure in the future.

The region's economic structure continues to depend on the oil and gas sector, which forms the basis of exports: hydrocarbons and related products account for about 98% of the export basket. The major KPO project is the largest driver. However, non-resource-based industries are showing noticeable progress: mechanical engineering is developing, especially focused on oil and gas equipment; food processing is strengthening its position; and the share of agriculture focused on domestic and foreign markets is increasing. Trade, logistics, and services remain important sources of employment and ensure the stability of small and medium-sized businesses. SMEs account for 32.5% of the economy, which is below the national average, but small businesses continue to play a significant role in employment and socio-economic activity in the region.

The region's population income depends on the raw materials market. During periods of growth in world hydrocarbon prices, incomes exceeded the national average, but since 2020, the region has fallen behind by an average of 9%. The median wage is also lower than the national average (KZT 252,900 versus KZT 285,700), but the gender pay gap in the West Kazakhstan Region is one of the smallest in the country. The most dynamic wage growth in 2020–2024 was observed in the energy, finance, healthcare, and HoReCa sectors, while earnings in mining declined significantly due to industry restructuring.

The region's labor market remains stable: employment grew by 8.9%, the share of salaried workers increased, and self-employment declined. Unemployment fell to 4.8%, and youth unemployment to 3.8%. In the sectoral structure of employment, there is a noticeable shift from agriculture to trade, education, healthcare, and services. The manufacturing industry is expanding jobs, including in mechanical engineering and food processing. The forecast for 2025–2030 shows steady demand — about 9–10 thousand people annually, including the need for both highly qualified personnel (STEM fields, teachers, medical staff) and mass labor specialties (drivers, tractor drivers, farm machines operators, welders).

Projected Staffing Needs in the West Kazakhstan Region in 2026–2030



The environmental situation is becoming one of the key strategic challenges. Over the past 10 years, the number of emission sources has increased by 16.7%, especially in the Burlin and Baiterek districts. Emissions of hydrocarbons and ammonia have risen sharply, reflecting the technological limitations of enterprises and the need for accelerated modernization of treatment systems. Despite a decrease in per capita emissions, local environmental clusters continue to put pressure on quality of life and investment attractiveness.

The region's investment policy is focused on infrastructure modernization, processing expansion, and housing construction. In recent years, the largest investment flows have been directed to the oil and gas sector, construction, real estate operations, and transport infrastructure. Investments in social facilities such as schools, sports complexes, hospitals, and clinics have grown significantly. This has improved access to basic services and partially offset migration losses.

Despite the continuing risks, the region has significant potential. Manufacturing, logistics, agriculture, and services remain the key growth points. Further development will be linked to the modernization of production processes, digitalization, the transition to low-emission technologies, and the creation of high-quality living and working conditions for the population. Expansion of the non-resource-based sector, improvement of labor productivity, and creation of conditions for retaining and developing human capital will be of high priority for the coming years.

II.2. Challenges and Prospects for the Education in the Region

Secondary Education

The general secondary education system in the region is experiencing a complex burden associated with the demographic growth of the school population. Between 2015 and 2024, the number of primary school students increased by **31.6%**, secondary school students by **46.8%**, and senior school students by **32.6%**, resulting in increased class sizes and pressure on infrastructure and teaching staff. The most noticeable strain is on urban schools.

The region also faces a manifest **imbalance in educational trajectories:** in most cases, 11th grade graduates are

focused on obtaining higher education. Over the past decade, the share of those entering universities has exceeded two-thirds of the graduating students. This creates a trend toward "academization" which results in the system losing part of its mid-level personnel reserve. At the same time, graduates have **a very low rate of direct employment,** and a significant proportion of young people leave the region and the country, exacerbating the migration outflow of human capital.

Key challenges:

- overloaded infrastructure due to the growth in the number of schoolchildren;
- outflow of 11th grade graduates to universities outside the region;
- poor career guidance and low work motivation among schoolchildren;
- insufficient opportunities for developing soft and STEM skills.

Prospects:

- expansion of career guidance from grades 8–9;
- use of dual and modular programs in conjunction with schools;
- development of rural schools as local centers of competence;
- flexible school-college-university pathways and mobility between levels of education.

Vocational Education and Training (VET)

The vocational education and training system in West Kazakhstan Region is undergoing restructuring and is gradually losing its role as the main supplier of workers, although its potential remains significant. Over the past decade, the network has shrunk, with enrollment falling by almost a quarter, and young people are increasingly opting for universities, which reduces the influx into applied specialties and exacerbates the shortage of personnel in engineering, oil and gas, construction, transport, and agricultural professions, which are critical for the region's future employment. Against this backdrop, **the dual system is showing positive dynamics:** 13 urban and all rural colleges operate in a dual format, covering 33 professions and 52 qualifications; 2,559 students are enrolled in dual programs (more than 15% of the student body), and the partner network includes 156 mentor enterprises.

After consolidation, colleges switched to **a model of competence centers** with improved infrastructure and expanded links with employers, but the staff is aging, the proportion of teachers without a category remains high, and the material base has only been partially updated. This reduces the quality of practice-oriented training and exacerbates **the mismatch between training and the demands of the economy:** people with vocational education make up 63.7% of the employed population, but 17.6% of the unemployed. In these conditions, the key challenge is to maintain and restore the link between the training system and the real structure of the economy by strengthening engineering, agrotechnological, and digital areas and expanding practical training to form a sustainable core of mid-level personnel.

Key challenges:

- uneven quality of training in colleges;
- some programs do not meet the real needs of businesses;
- brain drain to universities (especially among 11th grade graduates);
- limited modern material and technical resources in a number of organizations.

Prospects:

- expansion of the dual format and university colleges;
- development of industry clusters: agriculture, mechanical engineering, oil and gas services;
- increase in flexible college-university pathways;
- strengthening competence centers in the regions;
- increasing the role of short-term programs for regional personnel demand.

Higher and Postgraduate Education

Higher education in the region is represented by **four universities**, two of which are state-owned. The total **student** body exceeds **41,000.** The structure of training is shifting towards engineering and digital professions, which meets the needs of the economy, but fundamental sciences, management, economics, and agricultural technologies remain underdeveloped, creating a risk of a shortage of managers, researchers, and specialists for the agro-industrial complex.

There is a gradual transition from quantitative growth to qualitative development:

- master's programs and scientific components are being expanded;
- international accreditation standards are being introduced;
- digital technologies are being used more actively.

However, the structure of the population by level of education presents certain challenges: the share of the population with higher education in the region is **25%**, which is below the average for Kazakhstan **(33.2%)**. This limits the potential for the development of innovative, knowledge-intensive areas and the training of digital experts.

Key challenges:

- low proportion of the population with higher education compared to the national average;
- competition with the country's leading universities and the outflow of applicants;
- the need to deepen research in STEM and engineering fields;
- limited integration with high-tech businesses.

Prospects:

- growth of research potential through master's/PhD programs;
- development of university infrastructure (laboratories, technology parks);
- digitization of learning processes;
- expansion of international partnerships and dual degree programs;
- strengthening the university-college-school link and university participation in career guidance.

Science and Innovation

Science and innovation in the region are developing at a moderate pace. The region's economy is primarily focused on industry and the oil and gas sector, which creates a high demand for mid-level personnel and hinders the development of high-tech industries.

High employment among people with higher and postgraduate education correlates with low unemployment among them (employed – 32.2% and unemployed – 2.7%), which demonstrates the demand for highly qualified personnel. Nevertheless, the proportion of employed people and researchers involved in R&D remains insufficient.

Despite the growing practical orientation of higher education and efforts to introduce research components, the following structural weaknesses remain: lack of research infrastructure, limited participation in R&D projects, low level of commercialization of results, and weak links between universities and business.

Key challenges:

- low proportion of workers with higher education in the population structure;
- weak integration of universities, business, and industry;
- insufficient material and technical base for advanced science;
- lack of research teams and commercialization practices.

Prospects:

- development of university research centers and laboratories;
- growth in the number of research programs at the master's/PhD level;
- creation of small innovative enterprises at universities;
- expansion of technology transfer and technology parks;
- integration with oil and gas and machine-building clusters.

Conclusions

The education system in West Kazakhstan Region is developing, supported by positive demographic trends and institutional reforms. The main structural challenge is the imbalance resulting from growing interest in higher education and a simultaneous shortage of mid-level personnel.

Vocational education and training (VET), is the most actively developing sector with a broad network of dual education and industry-specific programs established. Higher education is strengthening its academic component, but needs to deepen its scientific potential and integration with business.

Key tasks include improving the quality of training, modernizing infrastructure, balancing educational trajectories, developing STEM and research competencies, and forming an innovative ecosystem.

OPINIONS OF BUSINESSES, EDUCATORS, AND RESIDENTS OF THE REGION ABOUT THE FUTURE OF THE REGION

III.1. Business: What Future Do We Expect

Entrepreneurs in West Kazakhstan Region look to the future through the prism of technological change, border opportunities, and growing demands on the quality of human resources. Business expects that in the coming years, the region will enter a phase of active modernization — from the renewal of production facilities to transition to more complex forms of processing and the digitization of processes. The border location, strong raw material base, and active construction create the foundation for growth, but it is human capital that is becoming the determining factor.

The main demand from businesses remains access to qualified specialists: engineers, IT personnel, process engineers, agricultural machines operators, welders, designers, and automation specialists. Today, the shortage of workers and engineers is already limiting the expansion of production, and entrepreneurs are increasingly emphasizing the need for more practice-oriented training, dual education, and digital skills among graduates. Businesses are ready to invest in technology, but without personnel, these investments will not be effective — and this is the key risk that entrepreneurs cite as the most important.

At the same time, businesses are showing a high level of interest in innovation: digitalization, artificial intelligence, automation, and energy-efficient solutions are seen as essential elements of the region's future economy. Entrepreneurs link increased competitiveness to the modernization of equipment, the transition to more environmentally friendly technologies, the development of logistics, the intensification of raw material processing, and entry into new markets.

According to businesses, the future of the West Kazakhstan Region lies in using its border location and natural resources as a foundation, but focusing on developing competencies. Where there are qualified specialists and modern technologies, new production facilities, high value-added processing, export opportunities, and stable jobs emerge. This is exactly the kind of region entrepreneurs want to see in 5–10 years: diversified, technologically advanced, open to investment, and capable of retaining talented young people.

Personnel problems

An analysis of the opinions of entrepreneurs and experts in the West Kazakhstan region shows that the shortage of personnel has become one of the key systemic threats to the region's economy. Regardless of the industry — construction, mechanical engineering, agriculture, transport, food industry — businesses face the same problems.

Shortage of skilled workers

Blue-collar professions remain the most in demand: welders, agricultural machines operators, lathe operators, fitters, electricians, bricklayers, concrete workers, and operators of modern equipment.

According to entrepreneurs' estimates:

- the shortage of workers is acute in most enterprises;
- enterprises are forced to train employees themselves because graduates lack the necessary practical skills.

Shortage of engineering and technical experts

The region is experiencing a shortage of mechanical engineers, process engineers, designers, automation specialists, surveyors, and IT personnel.

- Experts note the following:
- Strong school graduates leave for Astana, Almaty, or abroad.
- The average level of preparation of prospective students is falling, which reduces the quality of engineering education.

The outflow of young people and the lack of young specialists in key industries

- Most college and university graduates do not return to rural areas.
- Young people prefer the service sector, trade, or office jobs.
- There is a critical shortage of young workers in agriculture, construction, and industry.

Mismatch between graduates' skills and business needs

- Employers note a low level of practical training.
- Young professionals do not know how to work with modern equipment, CNC machines, or digital systems.
- Some graduates are unfamiliar with basic production processes (e.g., they cannot identify agricultural crops).
- As a result, only 1 in 20 graduates actually remain in their field of study.

Weak motivation and lack of interest in real production

- Employers note low involvement among young people.
- Many employees cannot cope with the conditions of production and leave after a few weeks.
- Young professionals focus on salary rather than career path, which hinders the formation of a core workforce.

Shortage of management and specialized personnel

- There is a shortage of estimators, foremen, supervisors, food industry process engineers, occupational safety specialists, and injection molding machine engineers.
- In healthcare, there is an acute shortage of medical practitioners.
- In IT, there is a shortage of programmers, digitalization experts, cybersecurity specialists, and automation specialists.

Lack of practice-oriented training and a dual model on the necessary scale

- Companies emphasize that:
- educational programs are not keeping pace with technology;
- there is a lot of theory but little practice;
- dual training works in specific areas, but does not meet market demands.

Barriers to retaining employees

• low wages in a number of industries;
• lack of social retention measures;
• competition with large oil and gas companies that offer higher incomes.

What entrepreneurs are proposing in order to solve staffing problems

Entrepreneurs in West Kazakhstan Region are proposing a set of measures that should simultaneously improve the quality of training for specialists, increase the attractiveness of blue-collar professions, and create a steady flow of personnel to key industries. Despite differences between sectors, their proposals are surprisingly similar—businesses see the solution only in systemic, long-term changes.

1. Strengthening practice-oriented education and the dual model

Practical training should become a key element of education.

Experts emphasize that
- students should work on real equipment and perform real production tasks;
- dual education must be expanded to all technical specialties;
- companies are ready to take groups of students and guide them through all stages of training.

One employer puts it this way:
"We need to train specialists who can work from day one. There is theory, but no practice — that is the key problem."
(Expert, mechanical engineering).

2. Creation of retraining and advanced training institutions

Entrepreneurs believe that the region needs real, functioning centers for training and retraining adults.

- There are many people on the market with experience but without modern skills — they need to be retrained.
- There used to be powerful professional development institutions, but today they no longer exist.
- Employers cannot bear the costs of training in complex technologies on their own.

Experts emphasize:
"We buy modern combine-harvesters and photo separators, but there is no one to operate them — we send our employees abroad at our own expense." (Expert, agro-industrial complex).

3. A powerful combination of "education—production—business"

Companies propose creating a unified partnership mechanism between colleges, universities, and businesses.

Business expects:
- employer participation in the development of educational programs;
- joint laboratories and training grounds;
- participation of practicing engineers in teaching;
- mandatory internships and student participation in real projects.

"The learning process should be as close as possible to production—from the laboratory to the machine tool." (Expert, mechanical engineering).

4. Introduction of mandatory post-training work experience for grant recipients

This measure is particularly popular among employers in the food industry, medicine, and agriculture.

- Graduates leave, leaving the region without specialists.
- Companies consider it fair that state grants should be linked to mandatory work experience in the region.

"If there were mandatory work experience, companies would not experience such a shortage of personnel."
(Expert, food industry)

5. Increasing the attractiveness of vocational and engineering professions

Entrepreneurs propose:

- campaigns to promote blue-collar professions;
- increasing salaries;
- providing housing for young professionals;
- social packages, benefits, corporate programs.

"Welder, turner, mechanic—these are the professions of the future. But young people don't know this and have no motivation." (Expert, construction)

6. Targeted funding for shortage occupations

Businesses propose expanding regional grants and vouchers for:

- for construction, mechanical engineering, energy,
- food technology,
- for veterinary medicine and agronomy,
- logistics and transport.

"Grants should be given where there is a critical shortage, not where there is demand from applicants." (Expert, agro-industrial complex)

7. Support for the development of digital and engineering skills

Virtually all experts emphasize that

- Digital competencies should be fundamental to all specialties, from mechanical engineering to grain processing.
- skills in working with CNC, 3D modeling, digital twins, automation, and AI should be part of any program;
- Without this, graduates will not be able to work with new-generation technology.

"Whatever the profession, it needs to be linked to digital technologies and artificial intelligence." (Expert, construction)

8. Bridging the gap between education and industry requirements

Entrepreneurs expect educational programs to be updated:

- More specialized modules (rather than general areas);
- Division of technological professions into specific industries (dairy industry/ pasta production/meat processing, etc.);
- deepening of engineering and design disciplines.

"Estimators don't know how to make estimates, engineers don't know how to do calculations. We have to teach them from scratch." (Expert, construction)

9. Addressing low motivation and staff retention

Entrepreneurs believe that the following are needed:

- career paths within companies;
- mentoring systems;
- motivational programs for young professionals;
- targeted support for young families.

"If the right conditions are created, young people will stay. For now, they are leaving because of a lack of prospects." (Expert, mechanical engineering)

III.2. Teachers: Education – the Attraction of the Future

Four hundred and seventeen educators—school teachers, vocational education teachers, and higher education teachers—participated in the study of the education system in the West Kazakhstan Region. The sample represents a broad picture of regional education: 68% of respondents live in Uralsk, and 32% live in rural areas.

How educators assess the system for training future teachers

The survey data show that the core professional competencies are being developed quite well. For all key methodological skills — setting learning goals taking into account age characteristics, creating situations for success, maintaining learning motivation, lesson planning, and making pedagogical decisions — **75% to 86% of educators gave the assessment system a score of 4 or 5**. The ability to work with educational programs is particularly highly rated: almost **87%** of training in this area is considered to be of high quality.

Methodological and subject competence also demonstrate strong positions: 52.8% of respondents rate teaching methodology at 5 points, and 45% rate subject knowledge at the same level. This indicates a stable professional foundation on which the region's educational system is based.

Where the system is lagging behind

However, the picture is more tense in the personal and professional block. While **79%** of teachers consider the development of empathy to be extremely important, only **73.6%** note that it is actually formed by the system. The gap becomes even more noticeable in relation to self-organization: **76%** consider it a priority competence, but only **62.6%** are confident that it is actually developed during training. A similar situation can be observed with regard to self-reflection—a key competency in modern pedagogy that is necessary for sustainability, emotional balance, and manageability of professional growth.

The overall picture shows a systemic shift: teacher education maintains a strong theoretical and humanities focus, but does not sufficiently strengthen the skills of personal resilience, emotional competence, and digital self-regulation, which are critically important for modern teachers.

Key problems identified by teachers

Based on open-ended questions, five fundamental problems with the system stand out:

First, the predominance of the traditional information-subject model of teaching. Despite high ratings for the methodology on paper, teachers note the weak practical orientation of training, the lack of training, mentoring, situational practices, and retrospective analysis of pedagogical cases.

Second, there is a shortage of modern scientific and pedagogical personnel. According to respondents, some university and college teachers are not proficient in current technologies, digital tools, and methodologies, while professional development systems remain formal and do not solve the problem of lagging behind.

Thirdly, graduates come to schools insufficiently prepared for real work, especially in terms of student motivation, discipline, situational analysis, creating learning dynamics, and interacting with the class. This results in the need for further training of young specialists during their first 3-4 years of work.

Fourth, the system is not keeping pace with digitalization and changes in the industry. Programs are updated slowly, digital skills are developed in a fragmented manner, and teachers feel a growing gap between real school and the content of training.

Fifth, the mismatch between educational programs and employer demands is systemic, not isolated. This leads to schools and colleges having to take on

some of the functions of teacher training colleges.

How teachers themselves assess the overall quality of training

The final assessment shows cautious optimism. Almost **70%** of respondents consider the quality of training to be good or high, **28%** consider it average. Only **5%** assess the system as weak. This suggests that problem areas are recognized, but teachers do not perceive the situation as a crisis — rather as a point of mature challenges.

What teachers in the West Kazakhstan Region suggest:

The final assessment shows cautious optimism. Almost **70%** of respondents consider the quality of training to be good or high, **28%** consider it average. Only **5%** assess the system as weak. This suggests that problem areas are recognized, but teachers do not perceive the situation as a crisis — rather as a point of mature challenges.

1. Strengthen practical training

Teachers believe that graduates are not sufficiently prepared when they enter schools, so they suggest:

- expanding practical training from the first year;
- introduce long-term internships with experienced mentors;
- use demonstration lessons, supervision, and analysis of teaching situations;
- more actively involve employers—schools and colleges—in designing practical training

2. Modernize the content of teaching programs

Teachers want to strengthen:

- digital competencies (working with digital systems, assessment, AI services, lesson planning);
- ·self-organization, time management, and stress management skills;
- the development of empathy, reflection, and soft skills;
- modern teaching and assessment methods.

3. Improve the level of university and vocational education teachers

Educators believe that some teachers are professionally outdated. They propose:

- regular mandatory professional development;
- internships for teachers at schools and real educational organizations;
- replacing staff with young practitioners;
- expanding academic mobility.

4. Strengthen the link between education and practice

Teachers emphasize the need to:

- update educational programs to meet the real needs of schools;
- involve school principals and methodologists in updating programs;
- introduce a dual model of teacher training;
- organize flexible and modular programs for students.

5. Reduce educational inequality between urban and rural areas

Teachers consider it necessary to:

- improve the equipment of rural schools;
- a more even distribution of young professionals;
- increased support measures for teachers in rural areas (housing, allowances, digital equipment).

III.3. Population: Readiness for New Professions

Based on the results of a survey conducted among the population of West Kazakhstan Region, an analysis was carried out of residents' readiness to learn new professions, their professional orientations, motivation, self-assessment of skills, and perception of their own future. The survey covered 408 respondents aged 18 to 65, including 40.2% urban and 59.8% rural residents.

The survey of the population of West Kazakhstan Region revealed a combination of stability and readiness for change. Young people and urban residents are more actively seeking to change professions, motivated by development and the opportunity to increase their income. The most attractive areas remain logistics, management, industrial and legal professions, and flexible training formats are becoming a key tool for improving qualifications.

Despite the confidence of the majority in their own professional skills, a significant proportion of respondents acknowledge weaknesses in digital and "meta-skills." This underscores the need to invest in retraining programs, develop future skills, and create conditions for the sustainable growth of the region's human capital.

1. Willingness to change careers

Willingness to change careers varies and depends on both age and place of residence.

- Young people are the most mobile: among respondents aged 18–25, 34.9% are ready to change careers, and in the 26–35 age group, 38.0% are ready to do so.
- Among those aged 36–45, willingness drops to 30.2%, and among older groups, it falls sharply: among respondents aged 46–55, 16.8% are ready for change, and among those aged 56–65, only 8.1%.
- Urban residents show greater flexibility (30.8%) than rural residents (22.8%).
- The level of uncertainty ("can't say") is highest among young people and the elderly, at up to 33%.

Thus, young and urban residents are most inclined to change professions, while older age groups demonstrate professional stability and low mobility.

2. Main reasons for changing professions

The key motives of respondents reflect a desire for development and improvement in quality of life

- Desire to broaden horizons and develop — 27.3% (main reason);
- Change in life goals— 21.3%;
- Low pay — 15.4%;
- High workload (9.5%), professional stress (7.1%), and lack of career growth (6.1%) are also significant factors;
- Only a small proportion associate a change of profession with their specialty being in demand (2.7%) or a loss of interest (2.7%).

Thus, the motives of the population of the West Kazakhstan Region are shifting from "forced change" to "conscious development."

3. Interest in new professions

The population's demand is concentrated in areas where the combination of stability and development appears most attractive.

The greatest interest is in:

- Transport and logistics — 38 references;
- Administrative and management — 36 references;
- Law — 32 references;
- Industry — 30 references;
- Services — 24 references;
- Education and science — 20 references.

Less popular are construction, media, IT, and especially law enforcement (2).

The structure of the selection demonstrates an interest in professions that offer high income, stability, and career growth opportunities.

4. Preferences in training formats

The population of West Kazakhstan is oriented towards flexible education models:

- Complex learning (online + offline) — about 75% — is the most popular option.
- Fully online learning is chosen by 15% — mainly working adults and rural residents.
- About 10% prefer in-person learning, mainly young people.

Thus, the region is demonstrating a steady transition to modern learning formats and a demand for adaptive programs.

5. Self-assessment of professional and soft skills

The assessment of one's own competencies reveals the strengths and weaknesses of the region's human resources potential.

- Digital literacy: 48% are confident in their skills, but almost half admit to having weak skills.
- Emotional literacy: confident level — 48%, high rating — 7.8%.
- Evolutionary and existential literacy are the weakest: no respondent reported a high level, and most assess their proficiency as weak (45–54%).
- Project management: confident level — 39%, weak — 44%.
- Ecological thinking, artistic creativity, and systems thinking are developed mainly at a basic level.
- Programming and AI skills are practically absent: confident level — 0%, sufficient — 53%, weak — 40%.

Thus, the population is confident in its basic and professional skills, but lacks digital, innovative, and meta-competencies.

6. Perception of the future

Most residents of the region have a positive attitude toward their future:

- Completely confident — 45%,
- Rather confident — 35%,
- About 10% feel anxious,
- Completely uncertain — 5%.

The emotional background is predominantly positive: confidence and calmness dominate over anxiety and stress.


DIGITAL
MULTIMETER

WHERE ARE WE HEADING: TRENDS THAT ARE CHANGING THE FUTURE

IV.1. Future Trends in the Crude Oil and Associated Gas Production

GLOBAL TRENDS

1. Geological reserves reduction

In recent years, there has been a steady decline in proven and easily recoverable oil and associated gas reserves. Against the backdrop of depleting reserves, there is growing interest in methods to increase oil recovery and develop alternative energy sources. The trend toward declining geological reserves of oil and associated gas is driving structural changes in the mining and energy industries, from the search for new technologies and exploration strategies to the transition to sustainable, low-carbon energy sources. This leads to higher production costs, increased technological risks, and the need to implement innovative geological exploration technologies, including the use of artificial intelligence and 3D modeling.

2. Automation of production processes and the introduction of artificial intelligence

The modern mining industry is actively implementing digital technologies, robotization, and artificial intelligence systems to optimize all stages of the production cycle, from geological exploration to the transportation of raw materials. The use of autonomous equipment, drones, intelligent control systems, and predictive analytics makes it possible to increase productivity, reduce costs, and minimize the human factor. At the same time, there is a reduction in manual labor and the number of traditional jobs, which requires staff retraining and the development of digital skills. Thus, the trend reflects the industry's transition to smart, highly automated production systems that ensure efficiency, safety, and sustainability of production.

3. Cybersecurity enhancement

With the growth of digitalization and the introduction of automated control systems, mining companies are becoming more vulnerable to cyberattacks and data leaks. Enhanced cybersecurity is aimed at protecting industrial networks, digital platforms, sensors, and intelligent systems from external and internal threats. Companies are implementing monitoring, encryption, and multi-level data protection systems, as well as creating incident response centers. It is important to train staff in the basics of information security and to foster a corporate culture of digital protection. This trend ensures the stability of production processes, the protection of critical infrastructure, and the security of commercial information in the face of growing cyber risks.

4. Software improvement in the mining industry

Software improvement is becoming a key area of digital transformation for mining companies. Modern software solutions integrate geological exploration, equipment monitoring, logistics, and environmental control data into unified digital platforms. The development of specialized programs for 3D modeling of deposits, production forecasting, big data analysis, and production process management improves planning accuracy and decision-making efficiency. Cloud technologies, artificial intelligence, and machine learning systems are becoming increasingly widespread, enabling real-time monitoring of equipment status and optimization of operations. As a result, productivity increases, costs decrease, and the level of technological sustainability of enterprises grows.

5. Increased demand for data analysis in the mining industry

With the digitalization of production processes, there is a growing need for the systematic collection, processing, and analysis of large amounts of data. Companies use analytical platforms and Big Data technologies to optimize production, predict equipment condition, improve safety, and reduce costs. Data analysis enables informed management decisions, identifies inefficient areas of the production cycle, and predicts risks. Predictive analytics and artificial intelligence are actively developing, enabling the transition from reactive to proactive production management. Thus, data analysis is becoming a strategic tool for increasing the competitiveness and sustainability of mining companies.

6. Increasing the service life of technical equipment and using new materials (alloys) in its production

The modern mining industry seeks to increase the durability and reliability of technical equipment through the use of innovative materials and alloys. The use of wear- and corrosion-resistant composites, nanomaterials, and high-strength alloys significantly reduces the frequency of repairs, downtime, and operating costs. At the same time, technologies for predicting the technical condition of equipment using sensors and artificial intelligence systems are being introduced, which helps to extend its life cycle. This approach not only increases production efficiency, but also reduces waste and resource consumption. This trend generally reflects the industry's transition to a more reliable, energy-efficient, and environmentally sustainable technical base.

7. Increase in production volumes

Growing global demand for energy resources, metals, and mineral raw materials is stimulating an increase in production volumes in the mining industry. Companies are expanding their production capacities, developing new deposits, and introducing high-performance equipment. At the same time, digital monitoring and automation technologies are being actively used to optimize production processes and increase the efficiency of raw material extraction. However, increased production is accompanied by growing environmental and social risks, as well as higher energy and water consumption. As a result, this trend reflects the industry's desire to increase productivity while seeking a balance between economic benefits and sustainable development.

8. Deterioration of the environmental situation in mining areas

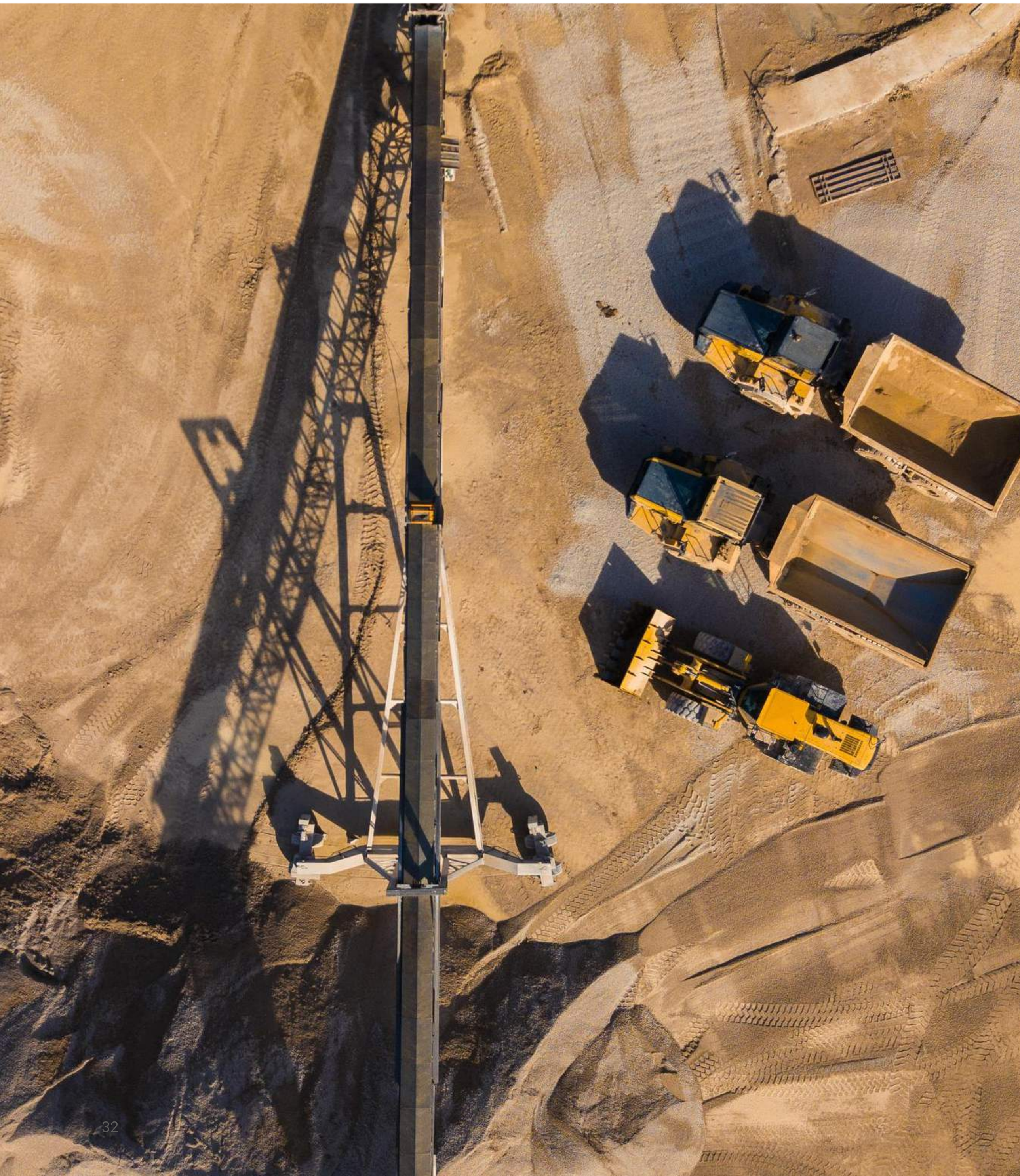
The intensive development of the mining industry is accompanied by an increase in the impact on the environment. The extraction and processing of minerals leads to soil, water, and air pollution, landscape disruption, and ecosystem degradation. The growth in waste volumes, oil spills, and greenhouse gas emissions increase the risk of environmental disasters and worsen living conditions for people in industrial regions. Despite the introduction of land reclamation and remediation technologies, the industry's level of environmental sustainability remains insufficient. This trend highlights the need to transition to more environmentally friendly and resource-efficient extraction technologies, as well as to strengthen government and corporate environmental control.

LOCAL TRENDS

9. Increased depreciation and disposal of equipment

The growth in production volumes and the prolonged use of equipment accelerate the wear and tear and depreciation of mining equipment. Companies are increasingly faced with the need to modernize or replace obsolete machinery and installations, which requires additional financial and material costs. At the same time, there is a

growing focus on **equipment disposal and recycling** in order to minimize environmental damage and make rational use of resources. Technologies for recycling metals, components, and parts are being developed, as well as programs to extend the service life of equipment through repair, modernization, and digital maintenance. This trend contributes to **increasing the environmental responsibility of enterprises and the formation of green economy principles** in the mining industry.



IV.2. Future Trends in Production of Oil and Gas Refining Product

GLOBAL TRENDS

1. The quality of the Green Forum is improving and the range of issues discussed is expanding.

Today, the Green Forum is the leading platform for discussing issues related to environmental protection, sustainable development, and ecological innovation: discussing new technologies for waste processing, sustainable consumption, climate change, and the introduction of green technologies in industry and everyday life.

2. Increasing the volume of oil fractions.

Today, there is growing interest in improving the efficiency of processing to maximize the yield of high-quality fractions such as gasoline, diesel, petrochemicals, and other valuable products.

3. Increasing BAT (best available technologies) for the disposal and processing of production waste.

This trend is associated with the gradual transition of enterprises to more environmentally friendly and resource-saving technologies, which includes the development and implementation of innovative methods such as biological treatment and ozonation, as well as the improvement of waste management systems and reuse to reduce the negative impact on the environment.

4. Increased investment from China.

Today, the main areas of Chinese investment are related to oil and gas processing projects, as well as the modernization of existing infrastructure and the creation of new processing facilities

LOCAL TRENDS

5. Enhanced training of process engineers.

There is a steady and active growth in demand and supply for the training of process engineers capable of working with modern, high-tech, and digital production facilities.

6. Improving oil separation quality.

The trend towards improving oil separation quality means continuous improvement of technologies and methods aimed at more efficient and thorough separation of oil from associated components: gas, water, mechanical impurities and salts. This is due to stricter environmental standards, changes in the properties of extracted oil and the desire to increase economic efficiency.

7. Increased construction of processing plants.

This trend is a strategic response to several key challenges: the desire to increase the added value of products, ensure energy security, and comply with new environmental standards. Instead of exporting crude oil and gas, countries and companies are increasingly focusing on deep processing to obtain more valuable end products.

8. Plant reconstruction is becoming more frequent

Today, instead of building new facilities, the industry is increasingly choosing to thoroughly modernize and technically re-equip existing capacities. This approach makes it possible to increase the efficiency of raw material processing, improve product

quality, reduce energy consumption and environmental impact, without incurring the enormous costs of building new facilities.

IV.3. Future Trends in the Manufacture of Machinery and Equipment

GLOBAL TRENDS

1. Increased consumption of additional energy sources

The entire manufacturing industry needs a source of energy. In the West Kazakhstan Region, water resources have traditionally been the main source of energy, but their scarcity in the region calls for alternative solutions. The sustainable development of machine building requires the introduction of renewable energy sources and the development of a "green" economy, given the high energy intensity of equipment and machine tools.

2. Increased demand for specialists with professional education

In order to grow the transport and machine-building industries and increase foreign and domestic machine-building production, there is growing interest and demand for specialists in the industry who have undergone career guidance from preschool to university.

3. Growing demand for the introduction of modern technologies

The rapid development of modern technologies is being observed throughout the world. In the West Kazakhstan Region, the pace of introduction of machine processing remains insufficient. To increase production efficiency, it is necessary to upgrade the material and technical base, purchase modern equipment from neighbouring and distant foreign countries, or create our own production enterprises and factories.

LOCAL TRENDS

4. Improvement and automation of technical production and processes

Elimination of manual labor in machine-building production and the introduction of automated systems contribute to improving product quality, optimizing production processes, and reducing time costs. In the context of the rapid development of artificial intelligence and digital technologies, the improvement of processes based on intellectual labor is becoming particularly relevant.

5. Increased demand for 3D, 5D, and 7D models

In mechanical engineering, there is a growing demand for 3D, 5D, and 7D models. This is because these technologies allow you to create prototypes, speed up production, optimize design, and create complex metals. While 3D modeling is used to create digital prototypes, 5D printing allows you to create objects with complex geometry, and 7D modeling (taking into account the movement of the tool along 7 axes) further speeds up production.

6. Reduction of industrial waste from geoproducts

The problem of reducing residual costs incurred in the repair of heavy and light industrial machinery is one of the primary issues behind its transformation into a business. In 2024, only 1/4 of the costs amounting 4 million were processed in the West Kazakhstan Region. Investors need to be attracted to process the costs.

7. Growing demand for prototyping

The growing local demand for prototyping is one of the key indicators of the development of the machine-building industry. Prototyping is an important tool in the fields of design, architecture, and information technology. Its active implementation

contributes to the development of technical education, digitalization processes, and the increase in the region's production capacity.

8. Growing demand for the exchange of experience for international cooperation

In the West Kazakhstan region, the use of the experience of the Russian Federation, China, and other foreign countries in the production of machinery and equipment is increasing. Active exchange of experience is accompanied by an increase in investment inflows. In the field of raw materials processing, considerable experience has been accumulated in the rational use of equipment and tools, which contributes to improving the quality of products and production processes.

9. Increase in the outflow of personnel abroad

There are a number of reasons why specialists who have received education abroad may leave again after repayment for their state grant. The main reasons are the higher level of living standards, labor productivity, and wages abroad.

10. Growing demand for training at the expense of employers

There is a growing demand from employers for qualified personnel. This is due to the fact that higher education institutions, secondary and vocational education institutions pay great attention to professional and practical orientation. In addition, educated and qualified specialists are always in demand. If a particular field of expertise is required in mechanical engineering, the management of the institution requiring such an expert is prepared to train this specialist at its own expense.

IV.4. Future Trends in Food Production

GLOBAL TRENDS

1. Demand for environmentally friendly products (halal products).

Products that meet halal standards are considered environmentally friendly, as their production complies with Islamic norms and excludes the use of prohibited ingredients, as well as complying with sanitary requirements. Halal certification confirms that the product does not contain haram ingredients and is manufactured on clean equipment, which makes it more environmentally friendly in terms of permissible substances.

2. Production of environmentally friendly products without GMO. Technology for the production of gluten-free products.

The production of environmentally friendly products without GMOs requires strict compliance with standards, the use of natural raw materials without genetic modification, and control at all stages of the production process. The technologies used to produce gluten-free products in the West Kazakhstan Region comply with international standards and are based on the use of alternative grains such as corn, buckwheat, and millet. These grains do not contain gluten and serve as the basis for bakery products, cereals, and other products for people with celiac disease or gluten intolerance. Separate lines are used for gluten-free products to avoid cross-contamination with gluten. Specialized recipes for gluten-free products are developed, taking into account the properties of gluten-free grains. The products are grown and manufactured without GMO. Environmental norms and standards are observed at all stages, from the cultivation of raw materials to processing. Natural ingredients that have not been genetically modified are used. Natural products often do not contain GMOs, but processed products such as soybean oil, corn syrup, and starch may contain GMOs.

3. Growth of advertising through social networks.

The growth of advertising activity for food products in the West Kazakhstan Region through social media is due to the advantages of social media marketing for this industry: low cost, direct channel of communication with consumers, wide audience reach, and the ability to accurately segment target groups. Effective promotion requires a strategic approach that includes analysis of the target audience, competitors, and product characteristics. Direct contact with consumers: social networks provide virtually direct communication with buyers, which helps build trust and gather feedback. The ability to quickly and cost-effectively convey information to a large number of users is a significant factor for food manufacturers. Social platforms allow advertising campaigns to be tailored to specific audience segments based on interests, demographics, and user behavior.

LOCAL TRENDS

4. Use and consumption of domestic raw materials (products).

Domestic raw materials and processed products mainly meet the domestic demand of the region and Kazakhstan as a whole. The use of local agricultural products within the regional economy is a significant factor. In the West Kazakhstan Region, domestic raw materials from the oil and gas sector, food industry, and agriculture are used and consumed, as well as mineral resources for industry and construction. The main activities in the region include oil and gas production, processing of agricultural

products (grain, sugar beet, oilseeds), and the production of building materials from local deposits of sand, clay, and cement raw materials. The food industry uses products from the local agricultural sector, primarily grain crops such as wheat and oilseeds such as sunflowers.

5. Food delivery.

A new sector is actively developing in the West Kazakhstan Region: food delivery. In Uralsk, delivery is carried out through aggregators, large supermarket services, specialized local services, as well as directly from individual stores and markets. The Wolt platform allows users to order products from local supermarkets, such as Altyn Dar. In addition, many local companies and individual entrepreneurs organize delivery themselves using their Instagram pages. Some markets and stores have their own delivery services, information about which can be found on social networks or on their official websites. In addition to delivering ready-made meals, there are services that deliver goods from specialty stores, such as those selling vegetables, fruits, or cheeses.

6. Creativity and originality of proprietary technologies.

The ability to generate new, unique, and applicable ideas is the driving force behind a product's market competitiveness. This includes not only the introduction of innovative features or designs, but also the development of original solutions to problems, the exploration of new materials, and the formation of the consumer's emotional perception of the product. Creativity and originality in product development technology are key competitive advantages, allowing you to create not just a new product, but a unique offering that resonates with your target audience, stands out from the competition, and can become the basis for long-term success. Originality can be expressed through the use of new materials and non-standard production methods, which also affect the quality, cost, and environmental performance of the product.

7. Effective use of time in production.

Time management is key to the effective use of time in food production: planning tasks and prioritizing. Properly organizing the production schedule and logistics processes allows for the optimal use of the enterprise's resources and improves the quality of finished products. Thus, rational time management becomes a critical factor in the sustainable development of the region's food industry. The effective use of working time plays a significant role in increasing labor productivity and the competitiveness of food industry enterprises in the region. Rational organization of labor, the introduction of automation, and the digitization of production processes contribute to reducing time losses and increasing the volume of output.

8. Growth of technology software.

The growth in the implementation of software and modern technologies in the food sector of the West Kazakhstan region is driven by the automation of business processes, warehouse operations management, logistics, and analytics. This process is supported by the implementation of systems aimed at optimizing production processes, reducing waste, improving product quality, and ensuring safety requirements. Technologies contribute to increased efficiency at all levels of the production chain, from small catering businesses to large-scale production. Software solutions and technological tools allow for the optimization of technological processes, ensuring high quality indicators and compliance with safety standards. The development of software and technologies stimulates the formation of new areas, including the creation of alternative food products, such as plant-based meat and milk.

9. Increased exports of products - growth in imports of inexpensive goods.

In the West Kazakhstan Region, export potential is primarily determined by meat

products and grain, which can become significant drivers of economic growth. State support for local producers, the creation of favorable conditions for the development of the food industry, and the attraction of investment in these industries can ensure the further expansion of the region's export opportunities. At the same time, an increase in cheap imports may contribute to a decrease in prices for finished products, but poses a potential threat to domestic producers if their products are not competitive enough. The growth of imports intensifies competition in the domestic market and at the same time contributes to the creation of conditions for the emergence and development of new areas of production.

IV.5. Future Trends in the Construction Industry

GLOBAL TRENDS

1. Increased demand for BIM specialists (shortage of personnel with IT skills)

Today, construction is one of the most dynamically developing sectors of the economy. Building Information Modeling (BIM), based on the use of artificial intelligence technologies, is becoming increasingly widespread, contributing to the improvement of the quality and efficiency of construction processes. Current trends require the training of specialists who can combine traditional engineering knowledge with skills in working in a digital environment and proficiency in BIM modeling tools.

Growing demand from construction companies necessitates the development of competencies in complex BIM modeling among future specialists. Future specialists will work with BIM, a method of modeling buildings and its application in digital format using three-dimensional models and data.

2. Growth in the construction of "smart homes" as part of the Smart City concept

The Smart City concept and the growth in the number of smart homes are the result of rapid technological progress. Modern smart homes make extensive use of Internet of Things (IoT), automation, and artificial intelligence (AI) technologies. For example, temperature, lighting, and security control systems significantly improve the quality of life for residents.

Smart homes ensure the efficient use of energy resources: the use of solar panels, energy storage systems, and automatic lighting and heating helps to reduce energy costs and carbon footprints.

In addition, the introduction of security systems, video surveillance, and remote control functions increases the level of protection and comfort for residents. Smart homes also offer a wide range of services that simplify everyday life, from smart home appliances to integrated digital assistants.

The Smart City concept also takes environmental sustainability into account. Green infrastructure, efficient public transport systems, and improved urban spaces help address environmental issues.

This trend, the concept of eco-materials and smart cities, is a key direction in modern construction and urban development, aimed at sustainable development and improving quality of life.

3. Growing demand for skilled workers

Kazakhstan is experiencing rapid construction growth, with residential complexes, social facilities, and infrastructure projects being actively built. The increase in demand for workers is directly linked to the growth in economic activity and production volumes.

Many industries, especially construction, are experiencing a shortage of skilled professionals and workers capable of working with modern technologies. The introduction of digital solutions requires builders to adapt to modern requirements. This situation contributes to increased competition in the labor market, higher wages for workers, and improved professional training.

The current situation contributes to increased competition in the labor market, higher wages, and improved professional training, which has a positive overall impact on the development of the construction industry and the country's economy.

4. Tighter environmental standards

Environmental standards are being tightened in order to protect the environment and promote sustainable development. Governments and international organizations are strengthening environmental regulations, forcing companies and organizations to increase their environmental responsibility, reduce waste, and use renewable resources.

5. Software shortage

In the construction industry, the shortage of software is linked to technological developments. The construction sector uses rapidly developing technologies, in particular BIM (Building Information Modeling) and CAD (Computer-Aided Design) systems. The shortage of specialists who are proficient in these systems hinders the effective implementation of construction projects. This trend arises from a shortage of qualified programmers and engineers, especially for the development and implementation of specialized software tools for construction. Many specialists are limited to general programming skills, while the construction industry requires specific experience and knowledge.

6. Increased use of energy-efficient materials

This trend is focused on finding energy-saving solutions in the construction and manufacturing industries, where energy-efficient materials are increasingly being used. New materials such as thermal insulation polymers, energy-saving windows, and solar panels can improve environmental performance and reduce energy costs in construction projects.

7. Decrease in investment (financing) in the construction industry

The decline in investment in the construction industry may be due to economic instability and market changes. Large cities such as Almaty, Astana, and Shymkent are the leaders in investment in housing construction, accounting for almost half of the investment in the industry.

This circumstance limits the industry's development opportunities, current financial support is insufficient, and high prices make it difficult to implement new projects.

8. The use of new solutions and IT technologies in the construction industry and infrastructure is increasing

Various sectors of the economy are actively introducing IT technologies such as process digitization, automation, data analysis, and artificial intelligence. These solutions significantly increase efficiency, reduce costs, and improve the quality of services provided.

In the construction industry, IT technologies are used to automate, optimize, and improve efficiency at all stages of the project life cycle, from design to operation.

Key areas include: BIM (Building Information Modeling), which provides comprehensive management of building data; the use of artificial intelligence to analyze and forecast construction indicators; and the introduction of project management systems, sensors, and drones to monitor work progress and ensure site safety.

The implementation of digital solutions helps to accelerate construction processes, improve design accuracy, and increase management transparency.

LOCAL TRENDS

9. Modernization of building exteriors. Facade design

Today, technology plays a key role in the development of construction and architecture. In the near future, special attention will be paid to facades with integrated technologies,such as media facades (capable of displaying information and changing color), as well as "smart" facades with built-in sensors and climate control systems. In addition, facades manufactured using 3D printing and robotics can significantly speed up the construction process and reduce its cost.

Furthermore, innovative and environmentally friendly materials, such as energy-efficient panels and smoke-absorbing coatings, are increasingly being used, contributing to the sustainable development of the industry. Current trends highlight the need to introduce new digital models and technologies into construction. For example, one of the most promising is 3D visualization, which allows the creation of functional and aesthetically expressive facades. The "smart" facades of the future will be equipped with sensors and IoT technologies, providing automated control of climate, lighting, and other parameters, as well as optimization of energy consumption.

Media facades transform buildings into information panels with built-in media panels that can display images, change colors, and perform other functions

10. Increased use of eco-friendly and local materials

The increase in the use of eco-friendly and local materials is an important trend in modern construction and design. These materials are environmentally friendly, aimed at the efficient use of natural resources, and also support the local economy.

Eco-friendly materials are made from natural, recyclable materials, which reduces their harmful impact on the environment. The use of local materials also supports local producers and agriculture. It also reduces transportation costs and lowers the carbon footprint.

In addition, eco-materials are of higher quality and more durable than traditional materials. Their natural properties, such as high thermal and sound insulation, contribute to improving the energy efficiency of buildings and creating a comfortable living environment.

11. Increase in accidents due to non-compliance with safety regulations

Increased non-compliance with safety regulations in construction jeopardizes worker safety. These conditions lead to an increase in accidents on construction sites, violations of labor laws, and a decline in the quality of construction projects. This situation negatively affects the reputation of the industry and the morale of workers. The trend will be towards reducing risks in construction through digitalization, data utilization, and new technologies. One way to improve technical safety is through BIM modeling, which allows a digital model of the facility to be created at the initial stage. This can help identify potential hazards, such as intersecting utility lines or hard-to-reach areas, and prevent accidents on the construction site.

Drones and unmanned aerial vehicles are used to inspect hard-to-reach or hazardous areas, monitor high-altitude work, and identify safety violations over large areas.

Smart sensors can monitor the condition of structures, detect hazardous situations (such as gas levels or vibrations), and transmit data in real time, enabling a rapid response to threats.

VI.6. Future Trends in Transportation and Warehousing

GLOBAL TRENDS

1. Installation and implementation of a vehicle monitoring system

As part of the implementation of a transport monitoring system in the West Kazakhstan region, it is planned to equip the vehicle fleet with modern trackers and sensor modules, organize data transmission channels based on GSM technologies, and implement software solutions for the comprehensive collection, analysis, and display of information on vehicle movement, their routes, fuel consumption levels, and operating characteristics.

2. Digitization of traffic flows and border crossing points

The digitization of traffic flows and the modernization of checkpoints in the West Kazakhstan region involve the introduction of innovative infrastructure at facilities, including the Syrym checkpoint. The implementation of automated traffic control and regulation systems is aimed at improving the efficiency of logistics processes, reducing border crossing times, and creating an analytical database to improve traffic flow management.

3. Increase in freight traffic

The West Kazakhstan region has seen steady growth in freight traffic volumes, reflecting the overall trends in the development of Kazakhstan's transport and logistics industry. The revitalization of the industrial and trade sectors, as well as the digitization of transportation processes—the introduction of online orders, electronic waybills, and transport monitoring systems—are ensuring the growth of logistics operations efficiency. Increased production in the oil and gas, construction, and agricultural sectors is creating additional demand for the delivery of raw materials, fuel, building materials, and food. The expansion of the vehicle fleet, the emergence of new logistics centres and the intensification of transport confirm the positive dynamics of the region's economy. The favourable geographical location of the West Kazakhstan Region at the intersection of international transport routes connecting Kazakhstan and Russia strengthens its position as a strategic hub of the Eurasian logistics system.

4. Optimization of transport fleets

The transport industry in the West Kazakhstan Region is seeing a steady trend towards optimising the operation of transport fleets, aimed at increasing efficiency, reducing operating costs and improving environmental performance. The region is gradually replacing its outdated vehicle fleet with modern, energy-efficient models with lower emissions and fuel consumption. This modernization not only helps reduce operating costs, but also improves the environmental sustainability of transportation. Particular attention is being paid to the transition to alternative and energy-efficient fuels. More and more companies are introducing gas-powered vehicles, which allows them to simultaneously reduce transportation costs and lessen their impact on the environment. Digital transport management technologies are becoming widespread, including GPS monitoring systems, electronic tachographs, and specialized software for route analysis and vehicle loading. These tools make it possible to optimize schedules, reduce idle mileage, and increase overall productivity. The implementation of integrated logistics management systems provides real-time control over transport use, route planning, and cost management. In addition, drivers are trained in modern driving techniques, lean technology principles, and safe transport operation, which contributes to increased professional discipline and reduced accident rates.

5. Investment in safety, maintenance, repair, and cargo handling operations

Investments in the development and maintenance of the transport infrastructure of the West Kazakhstan Region contribute to the establishment of modern quality standards for transport services, aimed at improving the reliability of transport, reducing accidents, and ensuring the sustainable functioning of the regional transport system.

6. Expansion of the road network and speed cameras

At the same time, there is a steady trend in the region towards expanding the road network and strengthening the road safety control system, which is part of the state program to modernize the transport infrastructure of West Kazakhstan Region. Large-scale projects are being implemented for the construction and reconstruction of motorways, financed by state and local investments. Video surveillance systems for automatic recording of violations are being actively installed on urban and interregional roads, which contributes to the digitalization of traffic management and a reduction in accidents.

LOCAL TRENDS

7. Creation of warehousing and distribution centers at major transport hubs

In the West Kazakhstan Region, there is a marked trend towards the creation of new warehousing and distribution centers aimed at improving the efficiency of logistics processes and developing the region's transport and warehousing infrastructure. This process is driven by growth in trade turnover, the expansion of transport corridors, and the strengthening of the region's transit potential. The main areas of development are the formation of logistics hubs near key transport hubs, the construction of modern warehouse complexes, the active attraction of investment through public-private partnership mechanisms, the integration of warehouse facilities with the transport system, and the development of foreign economic activity logistics. An important element of the transformation is the transition to automation and digital management of warehouse processes, which increases their accuracy, speed, and transparency.

8. Development of logistics hubs at key transport hubs

There is a growing trend in the region towards the creation of a regional logistics hub — a modern center that combines the functions of warehousing, transportation, sorting, and distribution of goods. This project is considered a strategically important element in the development of the logistics infrastructure of the West Kazakhstan Region and is aimed at strengthening its position in the system of interregional and international transportation. Key objectives include the creation of a single cargo flow management center, the development of warehouse and digital infrastructure, the expansion of logistics services, the attraction of investment, and the creation of new jobs. The region's advantageous geographical location contributes to its transformation into an important hub for transit and distribution flows at the junction of Europe and Asia.

9. Road infrastructure development

The West Kazakhstan Region is actively implementing a strategic course for the development of road infrastructure, which is a key element in the modernization of the region's transport and logistics system. This process plays an important role in improving the efficiency of logistics operations, increasing cargo turnover, and forming a modern transport and warehouse cluster. The main areas of focus include large-scale reconstruction and construction of motorways, development of transport links between production and logistics zones, modernisation of access roads to warehouses and logistics hubs, and integration of the region into international transport corridors. In addition, there has been an increase in investment in the development of transport

infrastructure and the introduction of smart road technologies aimed at improving road safety and efficiency.

10. Increase in new transformative professions

This process is driven by the active digitalization of the logistics sector, the introduction of automated control systems, and the region's transition to modern standards of transport and warehousing activities. The development of the concept of "smart logistics" and the integration of digital technologies into transport and warehousing processes are contributing to the formation of new professional areas related to information flow management. At the same time, there is a growing need for specialists in maintenance, engineering, and "green logistics." The role of analytical and managerial competencies is growing. The increase in the number of new transformative specialties in the transport and warehousing sector of the West Kazakhstan region indicates the region's transition from traditional logistics approaches to an innovative, digital, and environmentally oriented model. This trend contributes to strengthening the region's competitiveness, creating high-tech jobs, and developing human resources that meet the requirements of the modern economy.

IV.7. Future Trends in Agriculture, Forestry, and Fisheries

GLOBAL TRENDS

1. Growth of digitalization and automation in the livestock sector.

The growth of digitalization and automation in animal husbandry is one of the key trends in the agricultural sector, aimed at increasing the efficiency, productivity, and profitability of farms. This trend reflects the transition from traditional farming methods to technologically advanced ones based on the collection, analysis, and use of data.

2. Low tree survival rate.

Today, a significant proportion of planted seedlings and saplings do not survive in the first years after planting, which leads to significant economic losses, a slowdown in the restoration of forest areas, and a decrease in the ecological potential of forests.

3. Strengthening of forest fire prevention and protection.

Increased effectiveness of comprehensive measures for the prevention and extinguishing of forest fires through the integration of new technologies and improved management. This trend reflects a shift from traditional, reactive methods of fighting forest fires to a systematic approach based on the integration of advanced technologies and improved management processes. This approach significantly increases the effectiveness of preventive measures, early detection, and firefighting, reducing economic losses and environmental damage.

4. Growth in comprehensive measures to combat drought.

The region is seeing a shift from local and short-term actions to a systematic approach that includes the introduction of water-saving technologies and the development of infrastructure for the accumulation and rational distribution of water resources.

5. Decrease in natural feed volumes

The trend towards a reduction in natural feed volumes is characterised by a decrease in the area of natural feeding grounds and a decline in their productivity. As a result, livestock farms are forced to look for alternative sources of feed, which affects the cost of production and profitability.

6. Increased demand for the application and implementation of international standards in organizations

In recent years, there has been a steady increase in the need to apply and implement international standards in organizations working in the oil and gas processing sector. This trend is driven by the globalization of the oil and gas market, the increasing complexity of technological processes, and stricter requirements for safety, quality, and environmental friendliness of production.

7. Decline in training for blue-collar professions (experts)

Today, the agricultural sector is experiencing a steady decline in the level and volume of training for workers in specialized fields (tractor drivers, machine operators, agronomists, animal breeders, agricultural machinery operators, livestock breeders, etc.), which is a systemic problem arising against the backdrop of the transformation of the agricultural sector, demographic shifts, and changes in the prestige of blue-collar professions.

LOCAL TRENDS

8. Growth in digitalization and automation in the livestock sector.

In the West Kazakhstan region, as in other agricultural regions of Kazakhstan, there is a steady trend towards the digitalisation and automation of the livestock sector. This process is driven by a number of factors, including government support, the desire of farms to increase efficiency and competitiveness, and the need to adapt to new technological challenges.

9. Active promotion and introduction of crop varieties and seeds adapted to local natural and climatic conditions.

In the West Kazakhstan region, there is active promotion and introduction of crop varieties and seeds adapted to local natural and climatic conditions. This trend is driven by the need to increase the resilience of agricultural production to the arid climate, low moisture levels, and temperature fluctuations characteristic of the region.

10. Increase in the breeding of local fish.

The region has seen a steady increase in the breeding of local (native) fish species, as opposed to the practice of using imported species in aquaculture. This trend is driven by a combination of environmental, economic, and social factors, and is also part of a broader strategy to ensure sustainable fisheries and biodiversity conservation.

11. Decline in the number of specialists with expertise in production processes.

The region is seeing a decline in the number of skilled workers capable of managing modern production processes in the agricultural sector. This can be explained by several factors: an aging workforce (the proportion of workers of retirement and pre-retirement age in the industry is growing. Young people, as a rule, are not eager to work in agriculture due to the low attractiveness of the professions); population outflow from rural areas (migration to cities in search of higher-paying jobs and comfortable living conditions); low prestige of blue-collar professions (agricultural professions are often perceived as unprestigious and difficult, which reduces interest in them among young people).

12. Growing dependence on imported biotechnologies due to their high cost and difficulty in adapting them to local conditions.

The West Kazakhstan region (WKR) faces growing dependence on imported biotechnologies. This dependence is due to a number of factors, including the high cost of foreign solutions and the difficulty of adapting them to local conditions. As a result, the region cannot fully exploit the potential of biotechnology to increase crop yields, livestock productivity, and solve environmental problems.

Future Trends in Education

GLOBAL TRENDS

1. Increased demand for dual degree programs

Graduates who participate in international education programs have significant advantages in the labor market. International academic mobility contributes to the deepening of knowledge, the expansion of professional competencies, and the development of intercultural skills, as well as saving time and resources through the effective organization of training. Holders of double degrees have a broad outlook, high adaptability, and the ability to work effectively in international teams, which makes them particularly sought after in the context of global competition.

2. Increased demand for the introduction of distance online learning in education

Accessibility of education and development from anywhere in the world. The online format of learning eliminates geographical barriers, providing the opportunity to receive an education at leading foreign universities without leaving your city. This format provides flexibility and an individual approach — students can choose a convenient time and pace of study, combining it with work or other responsibilities. This contributes to increasing the accessibility of education and expanding opportunities for professional and personal growth.

3. Increased use of artificial intelligence in education

Artificial intelligence (AI) plays a key role in personalizing learning. It adapts learning materials, methods, and pace to the individual needs of each student, creating unique educational trajectories. AI systems take on routine tasks—checking assignments, assessing progress, maintaining administrative records—freeing educators to develop their creative and methodological competencies. In addition, AI promotes inclusive education by adapting content to the needs of students with special educational needs and expanding access to learning for those who cannot attend traditional classes.

4. The growing problem of bullying among schoolchildren

According to the Ministry of Health of the Republic of Kazakhstan, about 20% of children are subjected to bullying. Despite the tightening of legislation (the introduction of fines for offenders) and the implementation of preventive measures, the problem remains highly relevant. The key factors in effectively combating bullying remain early intervention, increased attention from teachers, and the formation of trusting relationships between schools and families.

5. Growth in the number of teenagers addicted to the internet and media

Increased time spent on the internet leads to poor mental health and problems at school and at home. Active use of social media is associated with an increased risk of anxiety and depression in adolescents. Internet addiction can lead to a loss of real communication skills. Prolonged use of the internet causes scoliosis and heart disease.

6. Increase in the number of research projects using artificial intelligence

The fourth direction of the artificial intelligence development concept for 2024-2029: scientific research in the field of AI. Based on the experience of different countries, the state allocates significant funds to finance research and development projects using artificial intelligence. This includes support for fundamental and applied research aimed at developing artificial intelligence solutions for specific industries and sectors of the economy.

7. Shortage of cybersecurity specialists

There is a growing shortage of cybersecurity specialists worldwide, and cyber threats are spreading at an increasing rate. Over the past two years, the demand for cybersecurity specialists has doubled. 53% of such vacancies are in Almaty, 29% in Astana, and 8% in Uralsk. All other cities account for 10%. 44% of vacancies in the field of cybersecurity are mainly in "information technology, system integration, Internet," "financial sector" – 21% and "oil and gas" – 9% are required by operating companies.

LOCAL TRENDS

8. Shortage of specialists working with children with special educational needs

With the approval of the Concept of Inclusive Policy of the Republic of Kazakhstan for 2025–2030, the education system has been tasked with forming an inclusive society and environment that provides equal opportunities for all citizens, regardless of their physical, intellectual, social, or other characteristics. The implementation of this policy requires qualified specialists who are able to support and adapt students with special educational needs to the social and educational environment. Currently, there is a shortage of specialized teachers in schools and kindergartens, such as speech therapists, speech pathologists, typhlopedagogues, deaf educators, and tutors, which hinders the full implementation of the principles of inclusion.

9. Increased need for teacher retraining

Constant updates to the professional competency requirements for teachers necessitate regular retraining and professional development courses. The digitization of education, the active introduction of innovative tools and platforms, and new teaching methods—the emergence of effective pedagogical practices and methods (e.g., project-based learning, inclusive education)—require teachers to master modern teaching methods and technologies.

10. Increasing the number of practical experience in work-based curricula

Improves the quality of vocational training and its relevance to the labor market. In industrial practice, direct work at enterprises helps students to develop their skills in depth. Employers are motivated to develop specific projects and participate in research activities. Increases graduates' chances of successful employment.

11. Shortage of qualified career guidance specialists

Most schoolchildren do not have a clear idea of their future profession, which is due to a lack of career guidance specialists in the labor market. Educational institutions have limited resources and tools for effective career guidance, which makes it difficult to prepare students to make informed choices about their future careers. In addition, the development of career guidance requires time to accumulate experience and introduce modern methods and technologies, which slows down the process of producing new qualified specialists.

12. Increased efforts to introduce students to eternal and national values

This helps young people discover the richness and uniqueness of their native land, foster patriotic feelings, respect for traditions, and responsibility for the fate of their homeland. Cooperation with cultural institutions, public associations, veterans, and representatives of the clergy contributes to the active involvement of parents and family members in the process of raising children. Such interaction helps to strengthen the values of family, patriotism, and spiritual and moral education, as well as increases the effectiveness of educational programs in educational institutions.

13. Increasing the number of sports and health clubs to encourage students to participate in sports

It is necessary to expand access to sports infrastructure, diversify sports, motivate coaches, involve parents and the local community, and integrate sports into the educational process through extracurricular activities and school events. Use school resources for this purpose: maximize the use of school gyms, stadiums, and playgrounds for extracurricular activities.

14. Increase the number of youth start-up projects

Last year, the number of start-ups in Kazakhstan grew significantly and reached record levels. This creates more opportunities for young people. Start-up projects mainly focus on high-tech industries that attract young professionals, such as robotics and biotechnology. For example, Forbes' "30 under 30" projects and similar initiatives help identify and promote talented young entrepreneurs.

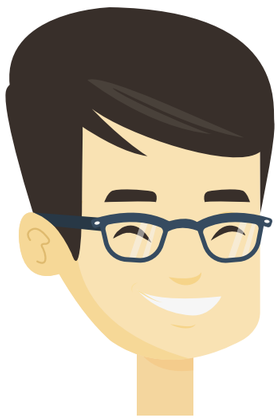
15. Increasing the interest of students and teaching staff in academic mobility

Academic mobility is a key element of the integration of education into the global community, which demonstrates the competitiveness of the national education system. For universities, it is an indicator of the attractiveness and quality of educational programs. In the context of globalization, interest in academic mobility is growing, attracting the attention of both young scientists and educators.

ATLAS OF NEW PROFESSIONS IN THE REGION

V.1. New Professions

MINING AND QUARRYING: EXTRACTION OF CRUDE OIL AND ASSOCIATED GAS



2030

GEOLOGIST OF TECHNOLOGY AND SPATIAL INFORMATION (TPI)

This is a new generation specialist working at the intersection of geology, digital technologies, and spatial analytics, uses artificial intelligence systems, geographic information systems (GIS), remote sensing, 3D modeling, and big data to analyze subsoil, forecast reserves, and monitor natural processes, and ensures the efficient and environmentally safe development of deposits, develops digital models of geological structures, and participates in strategic decision-making on the rational use of natural resources.

Key Competencies:

proficiency in geographic information systems (ArcGIS, QGIS) and 3D subsurface modeling tools, skills in processing and interpreting satellite data, remote sensing data, use of artificial intelligence and machine learning for geological data analysis, knowledge of modern methods of exploration and evaluation of mineral reserves, skills in working with databases, statistical analysis and digital maps, understanding of the principles of environmental and industrial safety in resource extraction.

Soft Skills:

critical thinking, systems analysis, forecasting, analytical thinking.

Education:

bachelor's degree, possible implementation of the educational program in collaboration with a research institute and an enterprise

2028

UAV OPERATOR IN THE OIL AND GAS INDUSTRY

It is a specialist who operates drones for monitoring, inspecting, and analyzing oil and gas infrastructure facilities. This person performs aerial and thermal imaging, monitors the condition of pipelines, drilling rigs, reservoirs, power lines, and conducts environmental and industrial monitoring. Using modern drones equipped with sensors, laser scanners (LiDAR), infrared and multispectral cameras, the operator ensures increased safety, reduced accident risks, and optimized production processes.

Key Competencies:

control of various types of UAVs (multicopters, aircraft, VTOL hybrids) in industrial areas, mastery of aerial photography technologies, 3D modeling and geospatial data analysis, skills in working with photogrammetric data processing software and geographic information systems (GIS), use of thermal imaging and infrared cameras to detect gas leaks and heat loss, basics of drone maintenance and calibration.

Soft Skills:

responsibility and attention to detail, systematic and analytical thinking, digital literacy, readiness for innovation and continuous learning

Education:

micro-qualification/Minor.

2030

TECHNOLOGIST AT UKGP/KPZ (DIGITAL CONTROL OF OIL AND GAS PREPARATION PROCESSES)

This is a specialist who manages the separation, stabilization, drying, and preparation of oil, gas, and condensate using automated and intelligent control systems. Responsible not only for equipment operation, but also for real-time data analysis, optimization of technological modes, and ensuring environmental safety of production. The profession combines engineering thinking, digital skills, and knowledge in the field of energy

Key Competencies:

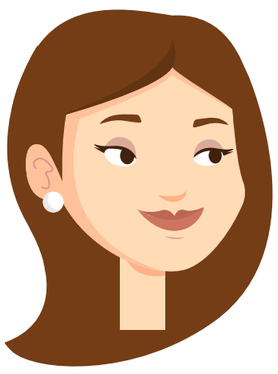
knowledge of oil, gas, and condensate processing technologies, ability to work with automation systems, basics of machine learning and process data analysis, energy management and environmental safety, digital literacy, skills in working with Big Data and industrial AI.

Soft Skills:

systems thinking and engineering logic, responsibility for industrial and environmental safety, flexibility and ability to learn new digital platforms.

Education:

technical and vocational education, bachelor's degree, master's degree.



2035

OIL AND GAS BIOTECHNOLOGIST

It is a professional who uses microorganisms and biotechnological methods to improve the efficiency of oil and gas production, industrial wastewater treatment, waste disposal, and ecosystem restoration after drilling and processing. This profession combines knowledge of microbiology, chemistry, engineering, and ecology with digital technologies and bioprocess modeling. This expert develops biological products to increase oil recovery, biotechnological purification systems, and closed ecological production cycles.

Key Competencies:

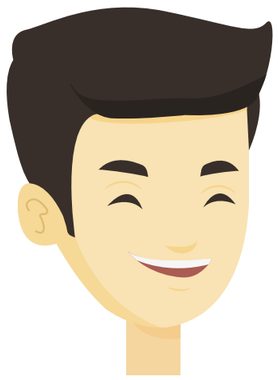
microbiology of oil-oxidizing bacteria and biochemistry of hydrocarbons, bioremediation and biodegradation technologies, fundamentals of oil and gas business and production processes, industrial biotechnology and bioprocess engineering, digital modeling of biochemical reactions, working with big data and AI.

Soft Skills:

systems thinking and environmental responsibility, scientific and engineering creativity, ability to develop innovations, interdisciplinary interaction with geologists, ecologists, and technologists

Education:

bachelor's degree, possible implementation of the educational program in collaboration with a research institute and an enterprise, training in short-term courses.



2028

TRAINING (RETRAINING) INSTRUCTOR

This specialist identifies needs for new competencies, develops effective employee retraining programs.

Key Competencies:

skills in assessing employee competencies; ability to work with different personality types, conflict management skills; ability to develop and modify training programs for different levels of training and specific tasks of departments.

Soft Skills:

analytical thinking, creative thinking, emotional intelligence, effective time management, flexibility, and adaptability.

Education:

technical and vocational education, bachelor's degree, master's degree.

2028

COST ESTIMATION ENGINEER (DIGITAL COST ESTIMATION DESIGN)

It is a specialist who determines the cost of construction, reconstruction, or repair of facilities, calculates the volume of materials, labor costs, and equipment expenses.

Key Competencies:

preparation and verification of cost estimation documentation at all stages of the project, calculation of the cost of materials, equipment, transportation, and installation work, analysis of design solutions from the point of view of economic feasibility, work in BIM cost estimation systems and digital project management platforms, application of AI for automation of calculations and cost forecasting

Soft Skills:

attentiveness and analytical thinking, responsibility and financial discipline, communication skills when working with designers, contractors, and customers, systematic thinking, and the ability to justify calculations.

Education:

bachelor's degree.

2029

NEURAL NETWORK AND MACHINE EQUIPMENT DEVELOPER

This professional designs, develops, tests, and adapts industrial electronics and software to the conditions of a specific enterprise, workshop, or site in order to optimize production processes.

Key Competencies:

knowledge and skills in digital circuitry, printed circuit board design, reading and using modern components; skills in working with specialized software; ability to work with microcontrollers and processors; skills in developing interfaces for interaction with industrial systems.

Soft Skills:

communication skills, creativity, innovation, adaptability

Education: technical and vocational education, bachelor's degree

2029

SUSTAINABLE DEVELOPMENT AND GREEN TECHNOLOGY ENGINEER

It is a specialist who develops and implements engineering, technological, and organizational solutions aimed at reducing negative environmental impact, increasing energy efficiency, and transitioning to a circular (closed-loop) economy.

Key Competencies:

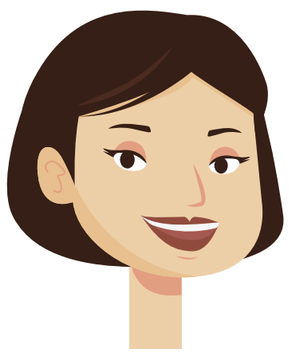
environmental design and green technologies, energy-efficient and low-carbon engineering solutions, product life cycle assessment and management, working with digital monitoring and data analysis systems, knowledge of international standards.

Soft Skills:

systems and strategic thinking, responsibility for long-term environmental and social impacts, communication and collaboration skills with teams of different profiles, project thinking and change management, creativity and innovation orientation.

Education:

technical and vocational education, bachelor's degree.



2029

ARTIFICIAL INTELLIGENCE (AI) LAWYER

This is a specialist who regulates legal relations related to the creation, implementation, and use of AI systems, analyzes risks related to algorithmic liability, data protection, intellectual property, and ethical aspects of automated decisions, works at the intersection of law, technology, and ethical philosophy, ensuring a balance between innovation and public safety.

Key Competencies:

knowledge of civil, information, copyright, and international law; understanding of the principles of AI, machine learning, and data processing; skills in legal analysis of digital products; knowledge of international acts and initiatives; ability to develop internal AI ethics and digital compliance policies.

Soft Skills:

analytical and critical thinking, ethical responsibility and neutrality in decision-making, communication skills and the ability to explain complex legal norms to developers and managers, flexibility of thinking and readiness to quickly master technologies, a systemic vision of human-machine interaction.

Education:

technical and vocational education, bachelor's degree.

MANUFACTURING INDUSTRY: PRODUCTION OF OIL AND GAS REFINING PRODUCTS

2033

UAV (UNMANNED AERIAL VEHICLE) OPERATOR

This specialist not only operates drones, but also has the engineering knowledge necessary for equipment maintenance and adaptation

Key Competencies:

The UAV operator uses drones equipped with thermal imaging cameras to detect gas leaks or overheating equipment on pipelines, tanks, and processing facilities, conducts detailed visual inspections of facilities (flare stacks, tall structures) that are difficult or dangerous for humans to inspect, enabling the timely detection of corrosion, damage, or defects; monitors hard-to-reach areas, uses drones to monitor the condition of facilities over large areas, in hard-to-reach places, or in extreme weather conditions, reducing risks to personnel and increasing efficiency; creates 3D modeling and mapping using artificial intelligence systems to automatically detect anomalies and predict problems; processes and analyzes images and videos obtained from drones to create detailed reports on the condition of equipment and infrastructure.

Soft Skills:

analytical thinking, communication skills, creativity, innovation, adaptability.

Education:

micro-qualification/Minor.

2035

HYDROGEN ENERGY ENGINEER

This specialist designs, implements, and operates systems for the production, storage, and use of hydrogen as an energy carrier. This expert ensures the safety, efficiency, and environmental friendliness of hydrogen technologies in the oil and gas industry.

Key Competencies:

design and optimization of hydrogen energy systems, knowledge of electrolysis, fuel cell and hydrogen storage technologies, assessment and management of risks associated with the safety of hydrogen systems, analysis of energy efficiency and environmental impact, use of specialized software for process modeling.

Soft Skills:

interdisciplinary collaboration and teamwork, project management and decision-making, effective communication and presentation of technical information, critical thinking and complex problem-solving, flexibility and adaptability to new technologies

Education:

bachelor's degree.

2035

INSTRUMENTATION AND CONTROL ENGINEER (SPECIALIST IN CONTROL AND MEASURING INSTRUMENTS AND AUTOMATION)

This is a control and measurement engineer works with control and measurement instruments and automation, is involved in the setup, monitoring, and maintenance of automation systems, repairs all electronic devices, performs timely testing of their condition and technical maintenance, implements modern technologies, new equipment, and modern automated lines, and works with digital control systems, smart sensors, and industrial networks.

Key Competencies:

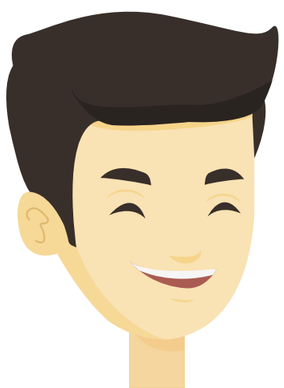
knowledge of the design of measuring instruments and the ability to perform repair work; knowledge of digital and smart control systems; integration and work with artificial intelligence; skills in digitalization and automation of production; competencies in the field of industrial cybersecurity; work with BAT (best available technologies); in-depth understanding of oil and gas processing technological processes.

Soft Skills:

critical thinking, systems analysis, forecasting, digital literacy

Education:

bachelor's degree.



2035

INSTRUMENTATION AND CONTROL ENGINEER

This is an instrumentation and control engineer in the oil and gas industry is not just a technical specialist who maintains sensors and instruments, but a key participant in digital transformation who works with intelligent control systems, analytics, and industrial internet technologies. This expert is responsible for ensuring the safety, efficiency, and environmental friendliness of complex technological processes at oil refineries and gas processing plants.

Key Competencies:

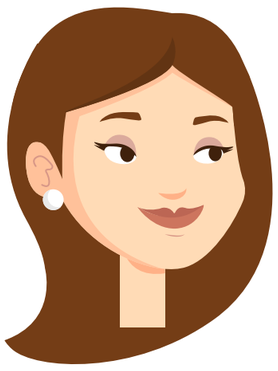
knowledge of automation (understanding the operation, design, and principles of complex equipment, including electronic and automatic systems; proficiency in metrology and calibration; ability to work with high-precision control and measuring instruments and systems; working with industrial equipment; operation and maintenance of block-modular equipment, separators, pumps, and valve blocks typical for the oil and gas industry; ability to diagnose and troubleshoot complex instruments and automation systems using advanced methods; collection, processing, and analysis of large amounts of data; use of artificial intelligence (AI)-based analytical systems; implementation and maintenance of industrial Internet of Things devices that enable remote monitoring and control of equipment; protection of industrial networks and automated control systems from cyber threats, which is becoming vital in the context of digitalization.

Soft Skills:

systems thinking, communication, teamwork, time management, critical thinking.

Education:

technical and vocational education.



2035

SPECIALIST IN DIGITAL QUALITY CONTROL OF MANUFACTURED PRODUCTS (DQC)

Modern oil and gas processing technologies require the implementation of automated quality control systems, real-time data analysis, and the use of digital tools (such as artificial intelligence (AI)) to predict quality and prevent deviations. This new type of specialist works not only with laboratory analyses, but also with intelligent monitoring systems, making the profession highly technological and in demand. They ensure the smooth operation of automated laboratories and use predictive analytics to forecast potential quality issues.

Key Competencies:

knowledge of standards and methods for analyzing petroleum products; ability to interpret the results of laboratory tests and online analyzers; understanding of the principles of distillation, reforming, hydrotreating, cracking, isomerization, and other processes; the relationship between product quality and technological parameters; predict changes in product quality at different stages of production, allowing technologists to quickly adjust plant operating modes; works with digital twins of production facilities to simulate the impact of parameter changes on the quality of the final product; ensures the integration of quality control systems with automated process control systems. (Automated process control systems); knowledge of oil and gas refining chemistry and technology, proficiency in modern analytical instruments, understanding of network protocols and automated process control systems.

Soft Skills:

ability to work in a team, communication skills, leadership, creative thinking, stress resistance.

Education:

bachelor's degree.

2035

LABORATORY ANALYST

This professional uses automated quality control systems and robotic laboratory complexes, which allows research to be conducted faster, more accurately, and more safely, minimizing the influence of the human factor. Participates in the digital monitoring of production processes, the integration of laboratory data into corporate quality management systems, and the sustainable development of oil and gas enterprises.

Key Competencies:

selection and analysis of oil, gas, and petroleum product samples using modern laboratory and digital equipment; determination of the physical and chemical properties and composition of samples; work with automated laboratory analysis systems and electronic databases; monitoring product compliance with ISO standards; maintaining the calibration and technical condition of laboratory instruments; maintaining digital records and analyzing data to optimize technological processes; knowledge of chemical and physicochemical methods of analysis of petroleum products; proficiency in modern instruments (chromatographs, spectrometers, analyzers, etc.); skills in working with digital control systems and databases; understanding of the principles of sustainable and environmentally safe production.

Soft Skills:

communication skills, creativity, innovation, adaptability.

Education:

technical and vocational education.

2035

BLOCKCHAIN TECHNOLOGY SPECIALIST IN OIL AND GAS LOGISTICS

This specialist does not simply coordinate transportation, but creates and maintains decentralized systems that ensure the transparency, security, and efficiency of the entire oil product supply chain, from extraction to the end consumer. The profession combines digital technologies, cybersecurity, and oil and gas production logistics. The use of blockchain eliminates intermediaries, prevents the falsification of data on the origin and quality of raw materials, and reduces document management costs. This contributes to the creation of "smart supply chains" and the implementation of sustainable, digital ecosystems in the oil and gas processing industry.

Key Competencies:

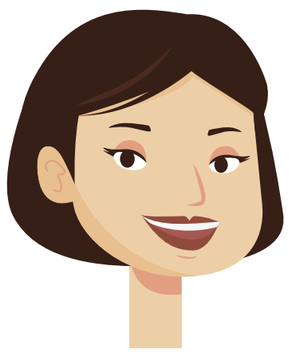
participation in the creation of corporate blockchain platforms adapted to the specifics of the oil and gas industry; working with smart contracts with software algorithms that automatically execute contract terms; integrating blockchain solutions with other enterprise IT systems; monitoring the entire supply chain (tracking petroleum products at every stage; recording all transactions related to the movement and processing of products; tracking carbon emissions data using a blockchain platform, which helps companies comply with environmental regulations and participate in carbon credit trading.

Soft Skills:

analytical thinking, communication skills, creativity, innovation, adaptability.

Education:

technical and vocational education



2036

ECO-ANALYST

This is a specialist who uses high-tech tools to assess and minimize the environmental impact of production, conducts environmental monitoring, digital control technologies, and artificial intelligence. The specialist uses sensors and automated systems to collect information on emissions, leaks, and the condition of soil, water, and air near oil and gas infrastructure facilities. Based on the data obtained, they develop digital models to predict environmental risks and optimize production processes.

Key Competencies:

Eco-analysts run digital environmental monitoring using an IIoT network of thousands of sensors across fields, pipelines and refineries. The system tracks air, water and soil conditions in real time. Analytical platforms process massive data streams, spot anomalies and flag risks early. Satellite imagery and drone data with spectrometers and thermal cameras help detect leaks and violations over large areas that can’t be seen from the ground. AI models predict the likelihood and impact of environmental incidents so companies can prevent accidents before they happen. Eco-analysts also use digital twins of sites and facilities to simulate scenarios and assess environmental effects.

Soft Skills:

critical thinking, communication skills, adaptability, creativity, time management skills.

Education:

technical and vocational education, bachelor's degree

2036

CARBON FOOTPRINT REDUCTION TECHNICIAN IN THE OIL AND GAS INDUSTRY

This is a specialist who develops and implements technological solutions aimed at reducing greenhouse gas emissions and improving the environmental efficiency of production processes in the oil and gas industry. He plays a key role in implementing the principles of "green energy" and sustainable development of enterprises.

Key Competencies:

monitoring and analysis of carbon and other pollutant emissions; implementation of technologies to reduce the carbon footprint and optimize energy consumption; monitoring the operation of carbon dioxide capture, storage, and utilization systems; participation in the development of environmental programs for enterprises; knowledge of oil and gas processing and energy efficiency principles; proficiency in carbon footprint calculation and analysis methods; skills in working with digital environmental monitoring systems; understanding of international ESG and sustainable development standards; ability to apply innovative technologies to reduce emissions.

Soft Skills:

analytical thinking, communication skills, creativity, innovation, adaptability.

Education:

technical and vocational education.

2036

DATA ANALYST IN THE OIL AND GAS INDUSTRY

This is a specialist who combines knowledge of statistics and programming with a deep understanding of oil refining and petrochemical technologies. This expert does not simply collect information, but identify hidden patterns and provide insights that help optimize production processes, improve safety, and reduce costs.

Key Competencies:

collecting and systematizing data from production facilities, sensors, and laboratory systems; analyzing production indicators using modern analytical tools; forecasting the efficiency of processing and identifying bottlenecks; participation in the implementation of digital platforms and predictive analytics algorithms; proficiency in data analysis tools; understanding of oil refining and petrochemical processes; knowledge of statistical modeling principles.

Soft Skills:

analytical thinking, communication skills, creativity, innovation, adaptability.

Education:

technical and vocational education.

2035

RENEWABLE ENERGY TECHNICIAN IN THE OIL AND GAS INDUSTRY

This profession combines traditional energy with modern green technologies. Technicians are involved in integrating renewable energy systems into oil and gas processing infrastructure, optimizing energy consumption, and applying hybrid energy solutions. This contributes to the industry's transition to a low-carbon economy and sustainable development

Key Competencies:

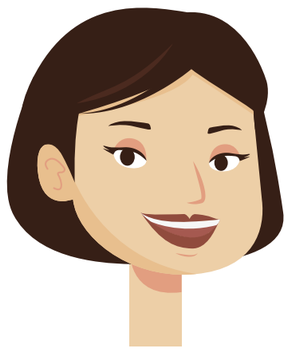
installation, configuration, and maintenance of renewable energy systems (solar panels, wind turbines, etc.); assessment of the potential for using renewable sources at oil and gas facilities; monitoring energy efficiency and environmental performance; developing proposals for modernizing energy infrastructure; knowledge of the principles of renewable energy systems and traditional energy; skills in designing and maintaining energy equipment; understanding of oil and gas processing and energy consumption processes; proficiency in digital monitoring and automation systems.

Soft Skills:

analytical thinking, communication skills, creativity, innovation, adaptability.

Education:

technical and vocational education



2037

ESG SPECIALIST IN THE OIL AND GAS INDUSTRY

ESG specialists use innovative approaches to assess carbon footprints, introduce green technologies into oil and gas processing, and monitor the impact of production on the environment and interactions with society. They play a key role in transforming the industry towards a sustainable and low-carbon development model.

Key Competencies:

development and implementation of ESG strategies for enterprises; monitoring of environmental indicators and social impact; preparation of reports in accordance with international ESG standards; analysis of risks associated with climate change and regulatory requirements; interaction with investors, government agencies, and public organizations; knowledge of sustainable development and corporate governance principles; proficiency in carbon footprint and eco-risk analysis tools; understanding of oil and gas processing technologies; skills in preparing ESG reports and working with digital platforms.

Soft Skills:

analytical thinking, communication skills, creativity, innovation, adaptability.

Education:

technical and vocational education.

2038

SPECIALIST IN THE INTEGRATION OF INNOVATIVE TECHNOLOGIES IN OIL AND GAS CHEMISTRY (INTEGRATION ENGINEER)

This is a specialist in the integration of innovative technologies focuses on the implementation and adaptation of advanced solutions to improve the efficiency, safety, and environmental friendliness of production. Their work covers the entire innovation life cycle, from search and analysis to implementation and evaluation of results.

Key Competencies:

The specialist tracks global and industry trends, new research and start-ups in oil and gas chemistry, biotechnology and digitalisation. They assess current technologies, estimate the value of new ones by analysing costs, productivity gains and savings, and take part in piloting and scaling innovations. Using mathematical modelling and digital twins, they simulate processes and guide decisions. They also integrate IIoT sensors and AI systems to optimise production and data management, implement resource-efficient solutions to cut energy and raw material use, and help introduce technologies for waste processing, emission capture and alternative feedstocks.

Soft Skills:

analytical thinking, creative thinking, emotional intelligence, effective time management, flexibility, and adaptability.

Education:

technical and vocational education.

2036

AUTONOMOUS PLATFORM OPERATOR IN THE OIL AND GAS INDUSTRY

The specialist manages and controls the operation of fully or partially robotic and unmanned production platforms and complexes using advanced technologies from a central control point, which may be located hundreds or thousands of kilometers away. The profession is based on the use of artificial intelligence technologies, digital twins, and automated control systems. The autonomous platform operator controls the operation of digital installations that can independently perform tasks related to monitoring, maintenance, and processing of raw materials. Such activities minimize human involvement in hazardous processes and increase production efficiency.

Key Competencies:

The specialist works in an operations center where real-time data is shown on large screens. He remotely oversees technological processes, equipment performance and key parameters. Using a digital twin of the platform, he tests scenarios, forecasts risks and optimizes operations before making changes on the actual site. He also manages autonomous robots and drones that patrol the area, inspect equipment, gather data and handle repairs in hazardous zones. AI systems process massive data streams, detect anomalies and offer recommendations, freeing the operator to focus on strategic decisions instead of routine monitoring.

Soft Skills:

analytical thinking, communication skills, creativity, innovation, adaptability.

Education:

technical and vocational education.

2040

DIGITAL QUALITY CONTROL LAB TECHNICIAN IN THE OIL AND GAS INDUSTRY

This profession is based on the use of digital platforms, automated sensors, and artificial intelligence for continuous monitoring of product quality. Digital lab assistants do not simply record results, but analyze large data sets, predict deviations, and help to adjust technological processes in a timely manner, increasing the efficiency and environmental safety of production.

Key Competencies:

in-depth knowledge of analytical chemistry and oil and gas processing technology; proficiency in modern analytical instruments and the ability to calibrate them; the specialist programs and controls the operation of automatic analyzers that determine the physical and chemical properties of petroleum products (fractional composition, viscosity, density) with high accuracy. The lab assistant is responsible for calibrating and maintaining robotic manipulators for sample preparation, which increases the speed and accuracy of analyses and reduces the risk of human error. They analyze large amounts of data from online analyzers, which allows them not only to control quality, but also identify trends and potential problems before they affect the final product. They use algorithms to predict changes in product quality at different stages of processing, which makes it possible to prevent the release of substandard products. They have knowledge of protecting information and industrial networks from cyber threats. An innovative laboratory assistant must have not only a chemical education, but also a range of modern skills.

Soft Skills:

mathematical mindset, critical thinking.

Education:

technical and vocational education, bachelor's degree.

2040

ROBOTICS TECHNICIAN IN THE OIL AND GAS INDUSTRY

A robotic systems technician works with intelligent machines, automated installations, unmanned devices, and robots for hazardous production areas. They ensure the integration of Internet technologies, machine vision systems, artificial intelligence, and predictive maintenance, enabling enterprises to transition to the concept of "smart manufacturing."

Key Competencies:

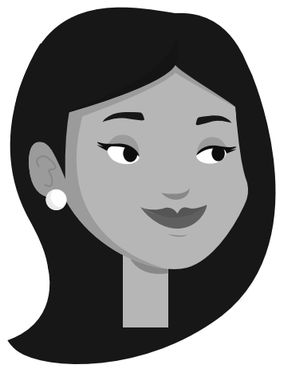
installation, configuration, and maintenance of robotic systems; monitoring the operation of automated installations and troubleshooting; calibration of sensors, transducers, and positioning systems; participation in the implementation of new robots and their integration into production lines; ensuring safety during the operation of robotic equipment; knowledge of the basics of mechatronics, electronics, and automatic control; proficiency in digital robot diagnostics and programming systems; skills in working with industrial networks and sensor devices; understanding of oil and gas processing technological processes.

Soft Skills:

analytical thinking, communication skills, creativity, innovation, adaptability.

Education:

Technical and vocational education.



2043

ARTIFICIAL INTELLIGENCE (AI) SPECIALIST IN THE OIL AND GAS INDUSTRY

This is a specialist who develops and implements intelligent digital solutions to optimize oil and gas production, transportation, and processing. Their work is aimed at improving the efficiency, safety, and environmental friendliness of production operations using AI and machine learning technologies.

Key Competencies:

development and implementation of AI algorithms for process analysis, creation of digital models to optimize production and processing, equipment condition forecasting and accident prevention; automation of control systems and improvement of the accuracy of production decisions; knowledge of the principles of artificial intelligence and data analysis; understanding of technological processes in the oil and gas industry; skills in working with industrial automation systems ; ability to integrate AI solutions into the existing infrastructure of the enterprise

Soft Skills:

analytical thinking, communication skills, creativity, innovation, adaptability

Education:

Technical and vocational education.

MANUFACTURING INDUSTRY: MACHINERY AND EQUIPMENT MANUFACTURING

2027

NDT FLAW DETECTOR/ NON-DESTRUCTIVE TESTER

A non-destructive testing specialist detects defects in materials, products, and structures without damaging them. Their work consists of diagnosing materials, products, and devices using various physical methods, such as ultrasonic, radiographic, magnetic, and others.

Key Competencies:

inspection of welds, welded joints, and seams in the industrial sector.

Soft Skills:

critical and analytical thinking, systems analysis, forecasting

Education:

post-secondary, bachelor's degree.

2030

ENERGY EFFICIENCY ENGINEER

This specialist reduces energy consumption at various enterprises or in construction, or optimizes the use of these resources.

Key Competencies:

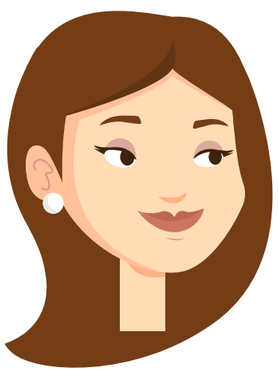
analysis of energy consumption, development of an energy saving program with the introduction of new technologies, improvement of economic efficiency based on the proposed analysis.

Soft Skills:

foresight, control, analysis, critical thinking, and regulation.

Education:

technical and vocational education, bachelor's degree.



2030

HEALTHY OR ECONOMICAL PRODUCTION TECHNOLOGIST / LEAN TECHNOLOGIST

This specialist optimizes production processes to increase efficiency and eliminate costs. Implements 5S and Kaizen methodologies and tools based on lean manufacturing principles.

Key Competencies:

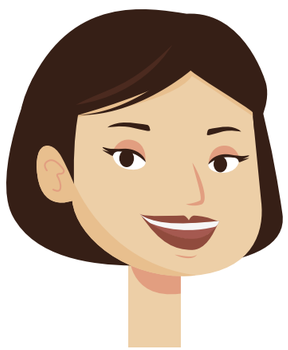
implementation and reworking of environmental processes, training staff in the use of economical means of production

Soft Skills:

ability to work in a team, communication skills, leadership, creative thinking

Education:

post-secondary.



2032

ADDITIVE TECHNOLOGY ENGINEER

This expert designs, configures, and controls processes for creating three-dimensional objects using the material deposition method. Selects 3D models and printing equipment, processes finished products.

Key Competencies:

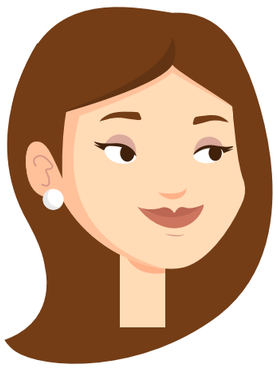
creation and optimization of 3D models, preparation and configuration of 3D printers, selection of materials, and control of the printing process.

Soft Skills:

leadership, creative and critical thinking, systems analysis and control.

Education:

post-secondary.



2030

REVERSE ENGINEER

This specialist determines the operating principles, structure, and functions of finished products. Based on the same analyses, they increase the number of products in production or find malfunctions and find analogues without direct copying.

Key Competencies:

laser scanning technologies and automated reverse engineering systems, material strength and aerodynamics, engineering analysis, technical documentation correction, use of 3D models or special programs.

Soft Skills:

system planning, critical and creative thinking, analytical thinking, ability to work in a team.

Education:

post-secondary, bachelor's degree.

2035

NEURAL NETWORK ENGINEER

This is a qualified specialist in the field of work and deep learning with digitized machine processes and IT management using artificial intelligence, version control systems (e.g., Git), and the Linux environment. A specialist involved in the design, development, training, testing, and deployment of neural network models for various tasks.

Key Competencies:

understanding of various machine learning algorithms, principles of neural network functioning, control methods, selection and debugging of neural network architecture.

Soft Skills:

mathematical analysis, IT design, critical and analytical thinking, stress resistance.

Education:

bachelor's degree.

2030

DIGITAL MANUFACTURING ENGINEER

This expert develops digital technologies and digital twins to optimize production processes, manages automated networks and machine programming, creates digital models of real objects, from individual material parts to entire production complexes. A specialist who analyzes their behavior and minimizes risks.

Key Competencies:

digital literacy, working with data, software, digital twins, systems thinking and CAD, configuration and use in the field of control systems and BIM software

Soft Skills:

mathematical analysis, critical and creative thinking, IT design and modeling.

Education:

bachelor's degree.

2030

PROGRAM DEVELOPMENT OPERATOR

This expert works with production machines includes configuration, implementation of control programs, control of the machining process, quality control of finished products, as well as routine maintenance of the machine and troubleshooting minor malfunctions. He/she adjusts, installs cutting and measuring tools, workpieces. Specialist in importing 3D models, building and verifying processing sequences and trajectories

Key Competencies:

ability to use relevant integrated development environments (IDEs). Optimisation of neural network performance and verification of its accuracy in test data. Ability of the engineer to use various indicators to assess model quality.

Soft Skills:

analytical thinking, teamwork, problem solving, adaptation, and mathematical systematization.

Education:

bachelor's degree

2030

CYBERSECURITY SPECIALIST

This is a specialist in protecting networks, servers, and databases in information and digital technologies, installing security systems, conducting internal audits and tests, responding to incidents and investigating cyberattacks, protecting network technologies, Internet protocols, and architecture in government agencies, IT companies and banks, operating systems, cryptography, authentication, log files, and network traffic.

Key Competencies:

participation in the creation and implementation of security policies and procedures, understanding of TCP/IP protocols, the principles of firewalls, routers, and intrusion detection systems, the ability to analyze events to determine the source of an attack and future prevention methods.

Soft Skills:

analytical thinking, teamwork, problem solving, adaptation, and mathematical systematization.

Education:

bachelor's degree.

2035

ITS AND AU INTELLIGENT TRANSPORT SYSTEMS OPERATOR

This expert is responsible for installation and diagnostics of Adas systems, working with thematic data and GPS monitoring, conducting basic traffic flow analyses. Knowledge of the principles of automatic control and robotics (Python, CFF, Motlon, PLC), software skills, specialist in the maintenance of communication sensors and electric mobility.

Key Competencies:

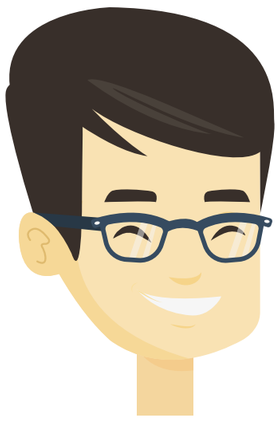
monitoring and technological control of ITS operations. Analysis of traffic flow and road condition data. Management and optimization of transport infrastructure. Implementation of cloud solutions and integration platforms.

Soft Skills:

analytical analysis, quick decision-making, teamwork skills, and stress resistance

Education:

post-secondary, bachelor's degree.



2040

TRANSPORTATION SYSTEMS, SAFETY, AND ENVIRONMENTAL REGULATION ENGINEER

This is an expert assessing the environmental impact of transport projects, developing plans to reduce pollution and noise, monitoring road safety. This specialist is responsible for ensuring the safety, reliability, and environmental sustainability of transport systems. This profession combines the functions of a road safety and environmental protection engineer in the context of transport infrastructure and use. It includes road risk analysis, development and implementation of safety systems, monitoring compliance with norms and standards, and reducing negative environmental impacts.

Key Competencies:

knowledge of environmental standards, road safety, environmental risk assessment and data analysis, proficiency in environmental monitoring tools.

Soft Skills:

responsibility, foresight, exactingness, business acumen, quick decision-making.

Education:

post-secondary, micro-qualification/Minor.

2040

AR/VR ENGINEER

This expert designs and implements AR/VR technology. A specialist who develops and implements software and hardware solutions in the field of virtual (VR) and augmented (AR) reality. They create applications for various devices (VR headsets, AR glasses, smartphones), work with 3D graphics, programming (often in C++ or using the Unity engine and C# language), and regulate user interaction with the digital world.

Key Competencies:

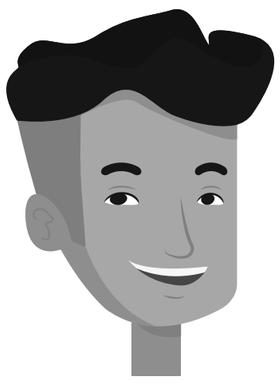
developing applications for various devices, from VR headsets and AR glasses to smartphones and computers, integrating and debugging three-dimensional objects in a virtual environment, and creating interface prototypes for new services and applications.

Soft Skills:

modeling, design, business, quick decision-making.

Education:

post-secondary, micro-qualification/Minor.



2027

UNMANNED AERIAL VEHICLE (UAV) OPERATOR

It is a specialist who remotely controls drones, prepares them for flight, and processes and analyzes the data obtained and draws up flight plans, checking and adjusting the aircraft, monitoring technical indicators during flight, and making decisions in emergency situations. This profession is in demand in agriculture, construction, cartography, geodesy, geology, security, and other fields.

Key Competencies:

analysis and processing of data obtained from aerial photographs or sensors, information obtained by unmanned aerial vehicles. Remote control of the device, monitoring its technical indicators, and adjusting the route in real time.

Soft Skills:

modeling, design, business, quick decision-making, good coordination of spatial movements and quick reactions, psychological stability.

Education:

micro-qualification/Minor.

MANUFACTURING INDUSTRY: FOOD PRODUCTION

2026

FOOD BIOTECHNOLOGIST

It is a specialist who applies scientific knowledge in the fields of biology, chemistry, and microbiology to develop and improve food products and technologies. This expert’s main tasks include quality control, developing new recipes, optimizing production processes, implementing environmentally friendly methods (e.g., enzyme production), and monitoring equipment condition.

Key Competencies:

in-depth knowledge of biotechnology, chemistry, and microbiology. Skills in managing and controlling production processes. Ability to implement new technologies and work with modern equipment. Ability to conduct scientific research and development.

Soft Skills:

analytical thinking, creative thinking, innovation, communication skills.

Education:

technical and vocational education, bachelor's degree, master's degree.

2027

ROBOTICS ENGINEER

It is a specialist (robotics engineer in food production) who designs, implements, maintains, and optimizes robotic systems to automate and improve the efficiency of production processes. This expert’s tasks include developing robots for operations such as picking, sorting, cutting, packaging, and quality control. The specialist is responsible for integrating software and hardware, solving technical problems, and ensuring compliance with safety and quality standards.

Key Competencies:

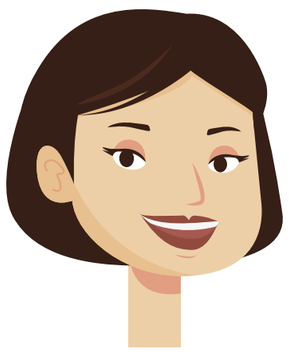
technical knowledge (mechanics, electronics, programming, automation), design and 3D modeling and design skills, understanding of the specifics of the food industry (sanitary standards, quality, safety), and soft skills (analytical thinking, teamwork, project management).

Soft Skills:

customer focus, systems thinking, project and process management, as well as teamwork and communication skills

Education:

technical and vocational education, bachelor's degree, master's degree.



2027

MOLECULAR NUTRITIONIST

It is a specialist in developing individual nutrition plans based on data about the molecular composition of food, taking into account the results of a person's genetic analysis and the characteristics of their physiological processes. This specialist must be competent in areas such as genome analysis and the biochemistry of physiological processes, as well as drawing up nutrition plans, monitoring diets, and analyzing results.

Key Competencies:

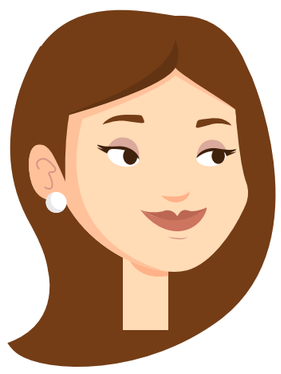
in-depth knowledge of genetics, biochemistry, and dietetics, ability to work with genetic and medical data, as well as advanced analytical and clinical skills for developing individualized nutrition programs.

Soft Skills:

communication and empathy, customer service skills, analytical and technical thinking, ability to work independently.

Education:

technical and vocational education, bachelor's degree, master's degree.



2028

NUTRITIONIST-DIETITIAN

This is a specialist who combines knowledge of nutrition science and dietetics. They help improve health through nutrition, create individual diets, and correct eating habits in both healthy people and those who need dietary support, but without medical intervention.

Key Competencies:

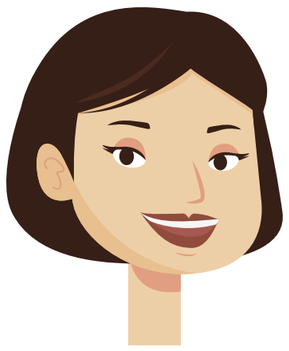
in-depth knowledge of dietetics, physiology, and biochemistry; ability to analyze client data and develop personalized nutrition plans; strong communication and analytical skills.

Soft Skills:

developing individual diets that take into account the client's goals, lifestyle, taste preferences, and restrictions; ability to analyze client medical data; understanding of the impact of emotions and stress on eating behavior; ability to analyze information.

Education:

technical and vocational education, bachelor's degree.



2028

FOOD STYLIST

This is a specialist who creates aesthetically appealing images of food for media, advertising, magazines, and cookbooks (photos and videos).

Key Competencies:

creative vision, knowledge of the basics of photography and composition, ability to work with products and props, as well as technical skills and personal qualities. Ability to work in photo editors, knowledge of current trends in food styling and the ability to integrate them into your style.

Soft Skills:

application of various techniques to give a dish the desired appearance, creation of a harmonious composition of food, props, and decor, preparation and presentation of dishes and products for photo and video shoots.

Education:

technical and vocational education.

2028

UAV OPERATOR AT GRAIN PROCESSING ENTERPRISES

It is a specialist who operates unmanned aerial vehicles to monitor, inspect, and optimize production processes and storage facilities. This person's responsibilities include pre-flight preparation of the aircraft, development of flight tasks, monitoring the technical condition of the drone, analysis of the data obtained (photos, videos), as well as technical maintenance and minor repairs of equipment.

Key Competencies:

UAV control, including manual and automatic, skills in using flight planning and data analysis software (e.g., GIS, photogrammetry), understanding of the principles of grain processing, basic knowledge of aerodynamics and UAV maintenance.

Soft Skills:

programming, robotics, artificial intelligence.

Education:

micro-qualification/Minor.

2030

FOOD DELIVERY MANAGER VIA LOCAL LOGISTICS PLATFORMS

Coordinator of fresh and frozen food delivery via integrated local services, route optimization, delivery quality control.

Key Competencies:

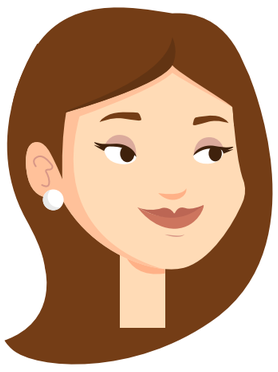
supply chain management, routing, working with vehicles and warehouses, basic data analysis.

Soft Skills:

communication skills, customer focus, stress resistance, responsibility for service quality.

Education:

Technical and vocational education.



2030

CERTIFIED ENVIRONMENTAL PRODUCT SPECIALIST

This expert ensures product compliance with halal standards and environmental requirements, supports certification and auditing supply chains.

Key Competencies:

knowledge of halal regulations, environmental safety standards, document management.

Soft Skills:

ethical thinking, attention to detail, negotiations with suppliers.

Education:

Technical and vocational education.

2031

SPECIALIST IN LOCAL CREATIVE TECHNOLOGY AND ORIGINAL RECIPES

This expert develops unique recipes and products based on local raw materials, patentes and protects proprietary technologies.

Key Competencies:

innovation in recipes, working with local ingredients, patenting.

Soft Skills:

creativity, ability to present ideas, collaboration with universities and small businesses.

Education:

technical and vocational education, short-term courses (certification).

2032

REGIONAL SUPPLY EXPORT-IMPORT POLICY MANAGER

This expert is responsible for coordination of domestic product exports, adaptation to foreign market requirements, optimization of customs procedures and logistics.

Key Competencies:

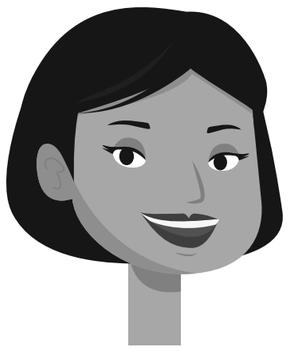
foreign trade, customs regulation, logistics, market analysis.

Soft Skills:

diplomacy, communication skills, strategic thinking.

Education:

Technical and vocational education.



2028

DIGITAL ADVERTISING AND SMM SPECIALIST FOR FOOD BRANDS IN THE REGION

This specialist creates content tailored to regional characteristics, manages advertising on social media, conversion analytics, and creative localization.

Key Competencies:

SMM, targeted advertising, data analytics

Soft Skills:

creativity, ability to quickly adapt to trends, teamwork.

Education:

Technical and vocational education.

2027

AGRICULTURAL EXPORT AND TRADE SPECIALIST

This is a specialist who will develop export strategies, analyze the needs of different countries, and adapt products to existing market requirements.

Key Competencies:

understanding of international trade, commerce, the global economy, and international economic relations; ability to conduct marketing research; skills in using statistical analysis tools and specialized data processing software ( ); knowledge of the principles of export-import operations.

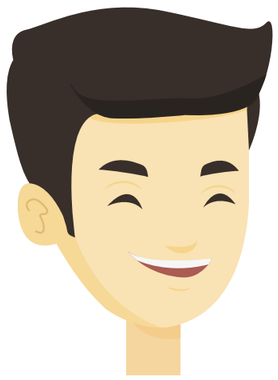
Soft Skills:

analytical thinking, communication skills, creative thinking, intercultural competence.

Education:

technical and vocational education, bachelor's degree.

CONSTRUCTION



2030

PERMANENT CONSTRUCTION ENGINEER

This expert develops projects using energy-saving, environmentally friendly, and sustainable technologies.

Key Competencies:

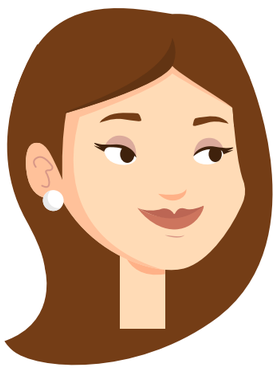
develops projects using energy-saving, environmentally friendly, and sustainable technologies

Soft Skills:

critical and systematic thinking, teamwork

Education:

bachelor's degree.



2030

BIM COORDINATOR

This expert manages digital construction models and coordinates project participants.

Key Competencies:

proficiency in basic construction software products, understanding of 3D modeling principles, knowledge of BIM integration principles with GIS, AR/VR, and digital twin technologies. Knowledge of construction codes and standards. Understanding of national (SP, SNiP, GOST) and international (ISO 19650, PAS 1192) BIM standards.

Soft Skills:

digital literacy, communication, project management.

Education:

bachelor's degree.

2030

CONSTRUCTION ROBOT COORDINATOR ENGINEER

This expert installs and maintains robots used on construction sites

Key Competencies:

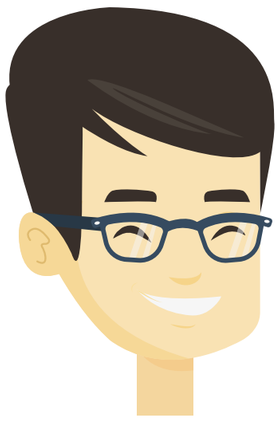
digital literacy, knowledge of the principles of construction robots, drones, and automated mechanisms.

Soft Skills:

creativity, adaptability, teamwork.

Education:

bachelor's degree.



2032

CONSTRUCTION ECO-ANALYST

This expert conducts environmental assessments of projects and carbon footprint analysis.

Key Competencies:

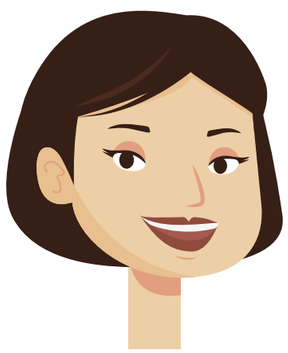
environmental auditing, data analysis

Soft Skills:

responsibility, environmental awareness.

Education:

bachelor's degree.



2030

3D BUILDING PRINTING ENGINEER

This expert operates 3D printing systems for building structures. Creates and reprograms construction programs.

Key Competencies:

Material manufacturing, 3D printing, automation

Soft Skills:

digital literacy and adaptability, design-project thinking.

Education:

bachelor's degree.

2028

UNMANNED AERIAL VEHICLE OPERATOR IN CONSTRUCTION

This specialist is responsible for using unmanned aerial vehicles to monitor, observe, and analyze construction projects at all stages of their construction. Performs aerial photography, 3D modeling of the terrain, inspection of hard-to-reach structures, monitoring of work progress and infrastructure condition. Drone data allows construction companies to obtain accurate geospatial information, reduce the risk of errors, and improve planning efficiency. Thanks to digitalization and the introduction of BIM technologies, drone operators are becoming the main link between the engineering team, designers, and IT specialists. Their work ensures the accuracy, safety, and transparency of the construction process.

Key Competencies:

control of various types of drones (multicopters, fixed-wing unmanned aerial vehicles, hybrid models). Aerial photography of construction sites, linear objects, and urban areas. Data processing and analysis (photogrammetry, orthophoto maps, 3D modeling, mapping). Data integration with BIM systems and GIS platforms. Assessment of the technical condition of structures using visual analysis and AI algorithms. Monitoring of safety and environmental parameters at construction sites. Preparation of reports and visualizations for design and engineering solutions.

Soft Skills:

Digital literacy and working with big data (Big Data, cloud services). Responsibility and attention to detail when working in hazardous areas. Critical thinking and data analysis skills

Education:

post-secondary education.

TRANSPORTATION AND WAREHOUSING

2028

DIGITAL LOGISTICS SPECIALIST

This is a specialist who carries out a comprehensive digital transformation of logistics processes aimed at improving the efficiency of the entire supply chain, from the manufacturer to the end consumer. This professional's activities are based on a synthesis of classic logistics principles and modern approaches to data management, process automation, and the integration of intelligent information systems.

Key Competencies:

design, implementation, and adaptation of specialized software solutions for warehouse management systems, application of analytical and digital tools to diagnose and eliminate bottlenecks in logistics flows, as well as to improve product storage, processing, and transportation processes. In-depth knowledge of modern logistics information management platforms and supply chain monitoring systems.

Soft Skills:

analytical thinking, communication skills, organization, responsibility.

Education:

bachelor's degree, master's degree.

2030

UAV MANAGEMENT SPECIALIST

This is an unmanned aerial vehicle (UAV) management specialist in the field of transport and warehouse logistics remotely controls drone flights to perform a wide range of tasks, including monitoring logistics routes, inspection of warehouse complexes and transport infrastructure, as well as the organization and implementation of cargo deliveries using autonomous aviation technologies.

Key Competencies:

developing and optimizing flight plans taking into account meteorological conditions and airspace regulations. Conducting pre-flight preparation, including technical inspection of the drone, calibration of navigation and sensor systems. Flight management, collection, processing, and interpretation of aerial data for analytical and logistical purposes. Performing maintenance and operational readiness checks of UAVs. Application of unmanned technologies for operational monitoring of logistical processes, infrastructure inspections, and cargo transportation.

Soft Skills:

analytical and spatial thinking, communication and teamwork, responsibility and attentiveness, quick decision-making.

Education:

micro-qualification/Minor.

2028

ROBOTIC WAREHOUSING SYSTEMS ENGINEER

This is a specialist who remotely controls robotic systems and is involved in the design, integration, operation, and technical support of automated and robotic warehouse complexes. Their work is aimed at improving the efficiency, accuracy, and safety of technological processes for storing, processing, and moving goods.

Key Competencies:

remote and operational control of robotic devices for various purposes in logistics and warehouse systems. Monitoring the technical condition, diagnostics, and ensuring the smooth operation of robotic equipment.

Soft Skills:

programming skills, technical knowledge, understanding of mechanics, electronics, and control systems.

Education:

technical and vocational education, bachelor's degree

2030

RENEWABLE ENERGY ENGINEER

This is a specialist engaged in the development, implementation, and operational support of energy-efficient systems based on the use of renewable energy sources (solar, wind, and others) designed to meet the energy needs of transport, logistics, and warehouse complexes. The main goal of their work is to reduce the energy costs of enterprises, minimize their carbon footprint, and increase the environmental sustainability of infrastructure, which is particularly important for the West Kazakhstan region, where the logistics sector is actively developing.

Key Competencies:

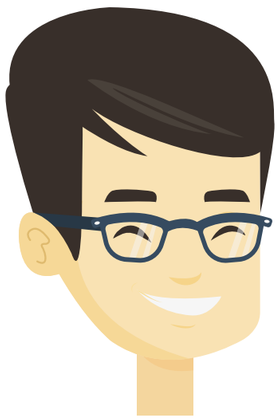
in-depth knowledge of the principles of solar and wind energy systems, as well as the basics of electrical engineering and energy conservation. Proficiency in working with design, engineering, and operational and technical documentation.

Soft Skills:

analytical mind, ability to solve complex technical problems, interest in innovation and ecology.

Education:

technical and vocational education, bachelor's degree



2030

EXPERT IN THE MANAGEMENT AND CONTROL OF COMPLEX INTELLIGENT SYSTEMS

This is a specialist who analyzes and interprets large-scale data arrays received from intelligent transport and logistics systems in order to identify inefficient areas, optimize operational processes, and improve the overall performance of logistics chains. He is responsible for the design, implementation, and management of highly automated and robotic logistics complexes, ensuring their stable and coordinated functioning within the digital infrastructure of the enterprise

Key Competencies:

developing architecture and strategies for integrating intelligent systems into the transport and logistics environment. Ensuring seamless interaction and synchronization of all intelligent components of automated complexes. Collection, processing, and analytical interpretation of big data from various sources to identify patterns, forecast logistics needs, and optimize management decisions

Soft Skills:

analytical thinking, communication skills, adaptability, business skills.

Education:

technical and vocational education, bachelor's degree.

2030

BIOMETRIC CONTROL TECHNICIAN

The specialist is responsible for the implementation, configuration, and operational management of biometric control and identification systems at transport and storage facilities. This expert’s activities include monitoring the functioning of systems, verifying and rechecking biometric data when violations are detected, and identifying offenders and wanted persons. The growth in passenger traffic and the need to improve the security of transport infrastructure require the continuous improvement of inspection and control technologies, which requires the involvement of qualified specialists to ensure reliable supervision.

Key Competencies:

ensuring security and maintaining high throughput at passenger transport hubs using biometric control and inspection systems. Updating and protecting biometric data, preventing unauthorized access and interference with systems. Effective interaction with security services, law enforcement, and emergency services to ensure comprehensive protection of transport infrastructure facilities

Soft Skills:

project and process management, customer focus, programming, robotics, artificial intelligence, cross-industry communication.

Education:

technical and vocational education, bachelor's degree, master's degree.

2029

ROBOTICS ENGINEER

This is a specialist who develops, implements, and improves robotic and automated technological processes at logistics enterprises, including facilities in the West Kazakhstan Region. He is responsible for the ongoing technical support of robotic complexes, performing adjustment and maintenance operations, carrying out minor repairs, and replacing consumable and wearable equipment components.

Key Competencies:

diagnostics, repair, and maintenance of robotic systems for various purposes and levels of automation. Interaction with suppliers and equipment manufacturers to eliminate serious technical malfunctions and modernize systems. Making adjustments to the software of robotic systems in order to optimize their functional characteristics and production operations.

Soft Skills:

systems thinking, programming, robotics, artificial intelligence, cross-industry communication, lean manufacturing.

Education:

technical and vocational education, bachelor's degree.

2030

HIGHWAY HYBRIDIZER

This specialist plays a key role in optimizing freight transportation processes, especially on long-distance and interregional routes. This professional’s activities are focused on the design and development of hybrid transport highways, including smart roads, railway branches, alternative transport routes, and mixed reality routes, as well as the creation of accompanying infrastructure for their effective functioning

Key Competencies:

development of multi-structural integrated hybrid transport corridor projects adapted for various types of future vehicles, taking into account their technical characteristics, level of automation, control methods, speed modes, and fuel and energy requirements; monitoring, analysis, and operational coordination of traffic flows at key intersections of basic highways to ensure their smooth and safe interaction.

Soft Skills:

systems thinking, programming, robotics, artificial intelligence, cross-industry communication, lean manufacturing, project and process management, cross-industry communication, environmental thinking.

Education:

bachelor's degree.

AGRICULTURE, FORESTRY, AND FISHERIES

2030

AGRICULTURAL COMPLEX OPERATOR-TECHNOLOGIST

This a highly qualified specialist who manages the entire vegetable production cycle in high-tech greenhouse complexes, operating, in particular, using Dutch technology. This profession combines in-depth knowledge of agronomy, plant biology, and engineering competencies with skills in working in a digital environment.

Key Competencies:

proficiency in digital microclimate control (the specialist monitors and optimizes plant growth parameters using automated climate control systems, manages temperature, humidity, lighting, and carbon dioxide concentration in the greenhouse); equipment setup and maintenance (responsible for the setup and trouble-free operation of complex equipment: drip irrigation systems, monitoring sensors, automated shading systems, as well as light culture and artificial lighting systems); managing plant nutrition and protection (preparing optimal nutrient solutions and ensuring their delivery, responsible for early diagnosis of diseases and implementation of biological plant protection measures, minimizing the use of chemicals).

Soft Skills:

personnel management and teamwork skills, forecasting, digital literacy.

Education:

post-secondary education, bachelor's degree.

2033

QUALITY AND SUSTAINABLE AGRICULTURAL PRODUCTION MANAGER

This is a specialist who manages and develops a quality management system at an agricultural enterprise using digital technologies, data analysis, and environmental standards to improve the efficiency, environmental friendliness, and competitiveness of production; implements intelligent quality control systems; develops and maintains QMS documents in digital format; analysis of production, quality, and sustainability data; monitoring compliance with standards (ISO, ESG, etc.); development of programs for greening and reducing carbon footprint; organization of internal audits and staff training.

Key Competencies:

knowledge of QMS standards; understanding of the principles and requirements of international and national standards, in particular ISO 9001; ability to describe, analyze, and optimize production processes in an agricultural enterprise in order to improve their efficiency and quality; planning, preparing, and conducting internal and external QMS audits, as well as monitoring the implementation of corrective measures; developing, updating, and monitoring all documentation related to the QMS; collecting and analyzing data on quality indicators, identifying trends and causes of non-conformities; assessing risks affecting the quality and safety of agricultural products and developing measures to minimize them.

Soft Skills:

systematic and strategic thinking, digital literacy, analytical thinking, communication and management skills.

Education:

technical and vocational education, bachelor's degree, master’s degree.

2029

CARBON FARMING AGRONOMIST

This is a specialist who manages agricultural production with the aim of increasing carbon sequestration and conservation in the soil; develops and implements agricultural practices aimed at increasing the organic carbon content in the soil: introduction of cover crops and green manure to enrich the soil with organic matter; optimization of crop rotation to preserve fertility and improve soil structure; rational use of organic fertilizers; use of modern methods and technologies for monitoring and quantifying soil carbon content.

Key Competencies:

knowledge of soil science, agronomy, and climatology; proficiency in digital soil and plant monitoring technologies (sensors, drones); ability to analyze carbon flows; ability to plan environmentally sustainable agricultural technologies; skills in working with biotechnologies and innovative fertilizers that reduce carbon footprints

Soft Skills:

systems and environmental thinking, digital literacy, communication skills.

Education:

post-secondary, bachelor's degree

2035

POULTRY FARMING SYSTEMS OPERATOR

This is a specialist working at the intersection of agricultural technology, digital solutions, and biotechnology in the field of poultry farming. This expert manages automated and intelligent systems for keeping, monitoring the microclimate, and feeding poultry, ensuring high product quality and sustainable production.

Key Competencies:

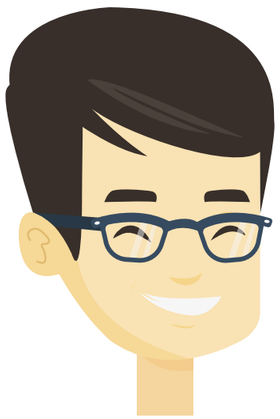
knowledge of the basics of poultry farming; understanding of poultry physiology and behavior, its nutritional needs and housing conditions; monitoring the health and condition of the flock; regular inspection of poultry, identification of signs of disease and the ability to carry out preventive veterinary measures; strict adherence to biosafety protocols to prevent the introduction of infections into the farm; understanding of the principles of feeding poultry, setting up automatic feeders, and controlling feed consumption; skills related to controlling the egg incubation and chick rearing processes.

Soft Skills:

ability to work in a team, communication skills, responsibility, attentiveness, technological literacy.

Education:

post-secondary.



2035

AQUATIC ORGANISM GENETICIST

This is a specialist engaged in breeding new fish species and hybrids. They use modern molecular and bioinformatics technologies to increase productivity, disease resistance, adaptation to climate change, and preservation of the biodiversity of aquatic ecosystems. Such specialists work at the intersection of genetics, biotechnology, ecology, and digital sciences, developing intelligent solutions for the sustainable development of aquaculture. The main tasks of aquatic organism geneticists are: conducting genetic and genomic research on aquatic organisms; developing programs for the selection and genetic improvement of fish and other aquatic organisms; analyzing and managing the genetic diversity of populations; developing environmentally safe genetic solutions to increase the sustainability of aquaculture systems; participating in programs to restore rare and endangered species.

Key Competencies:

knowledge of genetics, molecular biology, bioinformatics, and aquaculture; proficiency in DNA and RNA extraction, purification, and analysis methods; ability to perform PCR analysis; use of biotechnology for the selection of fish and other aquatic organisms; understanding of the environmental and ethical aspects of genetic technology applications.

Soft Skills:

systematic and critical thinking, scientific curiosity, environmental responsibility.

Education:

technical and vocational education.

2035

AUTOMATED LOGGING MACHINE OPERATOR

This is a specialist who operates modern digital and automated logging machines, ensuring efficiency, safety, and minimal environmental impact. They combine technical management skills, digital monitoring, and an environmentally sustainable approach to forest management. The main professional tasks of an automated logging machine operator are: managing and controlling automated logging machines; monitoring the condition of equipment and operating parameters through digital systems; optimizing the processes of felling, transporting, and processing timber; ensuring the safety and environmental sustainability of production.

Key Competencies:

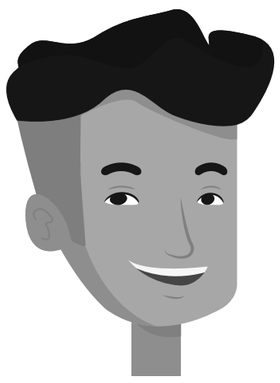
knowledge of forestry, mechanics, and automation; skills in working with digital equipment monitoring and control systems; understanding of the principles of sustainable and safe forest management.

Soft Skills:

technical literacy, attentiveness, responsibility.

Education:

technical and vocational education.



2036

AQUATIC ECOSYSTEM MICROBIOLOGIST

This is a specialist who studies microscopic life forms (bacteria, algae, fungi, viruses, etc.) inhabiting marine, freshwater, and artificial water systems. They investigate their role in biogeochemical cycles, water quality, the health of aquatic organisms, and ecosystem stability, and develop biotechnological solutions for cleaning, restoring, and improving the productivity of water bodies. Modern aquatic ecosystem microbiologists use innovative tools such as molecular biology, genomic technologies, bioinformatics, and artificial intelligence to create "smart" models for managing the state of aquatic biosystems. The main professional tasks of a water ecosystem microbiologist are: studying the composition and functions of aquatic microbial communities using microbiological, molecular, and genomic methods; monitoring the ecological state of aquatic ecosystems and water quality; developing and applying biotechnologies for cleaning aquatic environments (removing organic and toxic pollutants); creating probiotic and symbiotic technologies to improve the health and productivity of fish and other aquatic organisms; using digital platforms and AI systems to analyze bioindicators and predict changes in ecosystems.

Key Competencies:

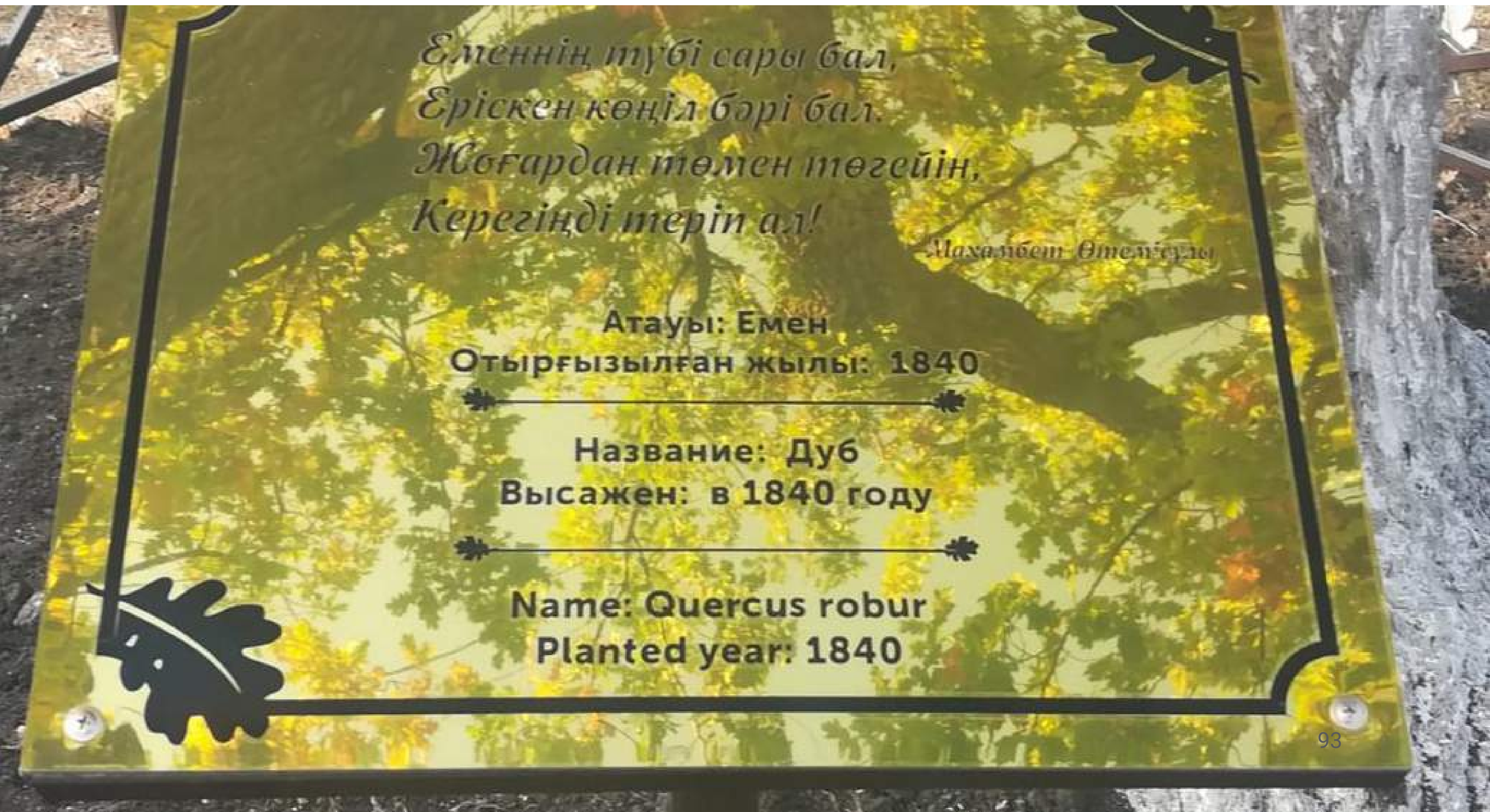
knowledge in the field of microbiology, biochemistry, molecular biology, and ecology of aquatic systems; proficiency in modern methods of genomic analysis and bioinformatics; skills in working with digital sensors, monitoring systems, and microbiome databases; researches water microflora and develops environmentally friendly and safe solutions for cleaning water bodies; understanding of environmental and climatic factors affecting microbial communities; ability to integrate biological knowledge with artificial intelligence and modeling technologies.

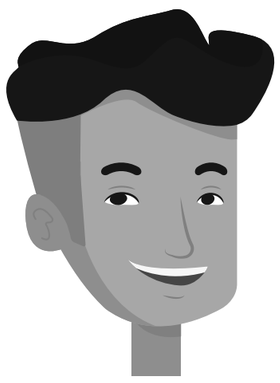
Soft Skills:

critical thinking, environmental responsibility, analytical thinking, readiness for innovation.

Education:

technical and vocational education, bachelor's degree





2036

INNOVATIVE BIOTECHNOLOGY ENGINEER FOR WASTE-FREE PRODUCTION

This is a specialist who develops and implements environmentally friendly, resource-saving, and technologically advanced production methods. They work at the intersection of biotechnology, environmental solutions, digitalization, and industrial production, creating systems where waste is minimized or completely recycled into valuable products (feed, biogas, fertilizers, etc.). The main professional tasks of an innovative biotechnology engineer for waste-free production are: developing and implementing waste-free biotechnological processes in production; creating cyclonic or closed production systems where resources are used as efficiently as possible; monitoring and control of environmental indicators and product safety; use of digital and automated systems for process management and quality control; optimization of production chains with minimization of waste and energy costs; development of innovative products from secondary production resources.

Key Competencies:

knowledge of biotechnology, ecology, chemistry, and digital technologies; skills in working with smart control systems, sensors, and automated processes; proficiency in waste disposal, bioremediation, and circular economy methods; ability to integrate scientific data into practical production solutions;

Soft Skills:

analytical thinking, communication skills, systems thinking, innovative approach, environmental and social responsibility.

Education:

technical and vocational education.

2036

AQUAMANAGEMENT AND E-FISHERY SYSTEMS OPERATOR

This is a specialist who manages and controls digital and automated fisheries systems. They ensure the health, growth, and productivity of aquatic organisms using intelligent monitoring, analytics, and feeding management technologies. The main professional tasks of an aquamanagement and e-fishery systems operator are: managing digital monitoring systems for aquatic ecosystems; monitoring water parameters, temperature, oxygen levels, and feed quality; using e-fishery platforms and similar systems to optimize fish feeding and growth; analyzing digital data to increase productivity and reduce losses; implementing innovative aquaculture management methods, including automation and remote control.

Key Competencies:

knowledge of aquaculture, aquatic biology, and hydrochemistry; proficiency in digital monitoring and analytics systems; skills in working with e-fishery platforms and automated feeders; ability to interpret data and make management decisions;

Soft Skills:

technical literacy, analytical thinking, attention to detail

Education:

Technical and vocational education.

2036

ECO-ANALYST

This is a specialist who collects, analyzes, and interprets environmental, biotechnical, and digital data to improve the sustainability, productivity, and environmental safety of agriculture, forestry, and fisheries. The main professional tasks of an eco-analyst are: collecting and analyzing data on the state of ecosystems, animals, plants, and water resources; assessing the environmental sustainability and efficiency of production processes; developing recommendations for optimizing agriculture, forestry, and fisheries; forecasting the impact of natural and man-made factors on ecosystems; implementing digital and automated monitoring systems.

Key Competencies:

knowledge in the field of ecology, agriculture, forestry, and aquaculture; skills in working with digital platforms, sensors, and analytics systems; ability to interpret big data and build ecosystem models; ability to work with methods of sustainable natural resource management.

Soft Skills:

analytical thinking, communication skills, analytical thinking, systematic approach, attention to detail.

Education:

Technical and vocational education.

2037

AGRICULTURAL UAV OPERATOR

This is a specialist who operates unmanned aerial vehicles for agriculture, forestry, and fisheries, providing monitoring, analysis, and optimization of production processes. They use digital technologies, sensor systems, and analytical platforms to improve the efficiency, sustainability, and environmental safety of production. The main professional tasks of an agro-industrial UAV operator are: management and control of agro-industrial UAVs; monitoring the condition of soil, crops, forest areas, and aquatic ecosystems; collecting and analyzing geospatial and biometric data; optimizing the processes of sowing, feeding, watering, and caring for plants and animals; ensuring environmental safety and minimizing impact on natur.

Key Competencies:

knowledge of agriculture, forestry, and fisheries; proficiency in UAV technologies, sensors, and digital monitoring platforms; ability to make data-driven decisions and predict outcomes.

Soft Skills:

analytical thinking, communication skills, technical literacy, attentiveness, responsibility, environmental awareness.

Education:

micro-qualification/Minor.

2038

ECO-BIOTECHNOLOGIST IN FISH FARMING AND AQUATIC ECOSYSTEMS

A new generation of specialists who combine knowledge in the fields of biotechnology, ecology, aquaculture, and digital technologies for the rational use and restoration of aquatic biological resources. These experts develop and implement environmentally friendly technologies for farming fish and other aquatic organisms, manage the quality of the aquatic environment, and contribute to the conservation of biodiversity and the sustainable development of aquatic ecosystems. This expert is engaged in the development and application of biotechnological methods in fish farming (microbiological preparations, probiotics, water purification technologies, selection and incubation); monitoring the ecological status of aquatic ecosystems and water quality parameters; introducing resource-saving and waste-free technologies in aquaculture; using digital systems for monitoring and managing fish farms; conducting ecotoxicological studies and assessing the impact of production on the environment.

Key Competencies:

knowledge of biotechnological processes in aquaculture; understanding of the ecology of aquatic ecosystems and the principles of sustainable development; proficiency in modern digital monitoring tools (sensors, automatic systems, analytical platforms); skills in environmental analysis and water quality management ; ability to develop and implement innovative technologies for keeping and feeding aquatic organisms; ability to calculate stocking density, feeding regimes, water and aeration regimes, ability to take samples and analyze biomaterial.

Soft Skills:

teamwork, analytical and systematic thinking, environmental responsibility

Education:

Technical and vocational education.

2039

CATTLE MONITORING SPECIALIST

This is a professional who uses modern technologies, digital platforms, and biometric systems to monitor the health, productivity, and behavior of animals. They ensure effective herd management, reduce disease risks, and increase the sustainability and profitability of livestock enterprises. Key professional tasks of a cattle monitoring specialist: monitoring the health and physiological condition of cattle using sensor technologies; monitoring the nutrition, activity, and reproductive status of animals; analyzing data to increase productivity and reduce losses; implementing digital tracking and automated accounting systems; developing recommendations for optimizing housing conditions

Key Competencies:

knowledge of animal husbandry, veterinary medicine, and biometrics; skills in working with digital monitoring platforms, sensors, and analytics; understanding of the principles of sustainable animal husbandry and bioethics; ability to process large amounts of data and make management decisions.

Soft Skills:

communication skills, attentiveness, analytical mind, responsibility

Education:

technical and vocational education.

2040

ECO-MARKETER OF FISH PRODUCTS

This is a specialist who combines knowledge of marketing, digital technologies, sustainable production, and ecology to promote fish and seafood products on the market. They create environmentally-oriented brands, generate demand for clean and safe aquaculture products, and implement innovative product promotion strategies. The main professional tasks of a fish product eco-marketer are: developing and implementing marketing strategies for environmentally friendly fish products, promoting products using digital platforms and social networks, analyzing the market, consumer preferences, and trends in the field of aquaculture products and seafood, creating informational and educational campaigns about the benefits and safety of products.

Key Competencies:

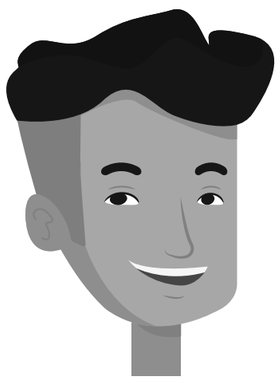
knowledge of marketing, digital technologies, and environmental standards; skills in branding, promotion through social networks and online platforms; understanding of environmental and sustainable production processes; ability to work with analytics and consumer data.

Soft Skills:

analytical thinking, communication skills, creativity, sociability, creativity, environmental responsibility

Education:

Technical and vocational education.



2043

FISH AND SEAFOOD PROCESSING TECHNOLOGIST

A specialist who combines knowledge of biotechnology, food technology, ecology, and digital tools for the efficient and sustainable processing of aquatic biological resources. These professionals develop and implement innovative, environmentally friendly, and resource-saving processing technologies, ensuring the quality, safety, and nutritional value of products. The main professional tasks of a fish and seafood processing technologist are: developing biotechnological and digital processes for processing fish and seafood; quality control of raw materials and finished products, ensuring food safety; implementation of resource-saving and waste-free technologies, including the processing of waste into feed or bio-products; use of digital systems for monitoring and automating production processes; development of innovative methods of preservation, fermentation, packaging, drying, and freezing.

Key Competencies:

knowledge of biotechnology, food technology, and food safety; proficiency in working with digital platforms and automated control systems; understanding of environmental and resource-saving technologies; proficiency in quality analysis, sanitary control, and certification methods; ability to develop innovative products and technologies

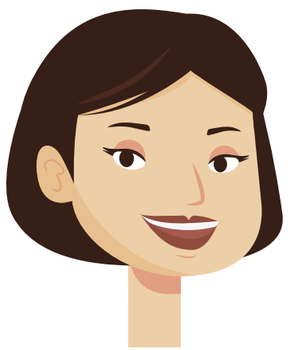
Soft Skills:

systems thinking, analytical skills, environmental responsibility, communication skills.

Education:

Technical and vocational education.

EDUCATION



2027

EDUCATIONAL DESIGNER

This specialist creates and designs effective educational programs, courses, and digital learning platforms using principles of pedagogy, psychology, and design.

Key Competencies:

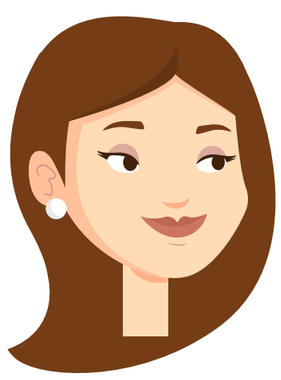
studying the needs of the education sector, defining learning objectives, monitoring the quality and effectiveness of materials, developing the structure of programs (texts, videos, tests) for blended, offline, and online courses.

Soft Skills:

digital literacy, design and visual modeling, critical and creative thinking, teamwork skills.

Education:

micro-qualification/Minor.



2028

CONTENT MANAGER

It is a specialist who creates, edits, organizes, and promotes informational content, with knowledge in the fields of marketing, advertising, public relations, and internet marketing.

Key Competencies:

ability to create and edit texts, graphic editors, and create CMS content plans, such as WordPress, understanding of responsible design principles.

Soft Skills:

digital literacy, analytical thinking, decision-making, teamwork skills.

Education:

micro-qualification/Minor.

2029

CAREER GUIDANCE ANALYST BY INDUSTRY

Using labor market and industry analysis, this professional assists graduates in choosing a profession by applying psychological methods. This expert analyzes the client's interests, abilities, and values, then matches them with the requirements of various fields to help them choose the optimal career path.

Key Competencies:

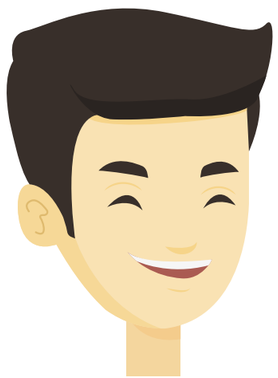
the specialist conducts psychological analysis, researches the state of the market and individual industries, and formulates proposals and recommendations based on a comparative analysis of current regulations and decrees.

Soft Skills:

decision-making assistance, psychological support, communication skills, digital literacy, analytical thinking.

Education:

technical and vocational education, bachelor's degree.



2026

ARTIFICIAL INTELLIGENCE AND CYBERSECURITY ANALYST

It is a specialist who uses AI analytical methods in technical research, prevents cyberattacks, and uses IT and machine learning capabilities to automate protection processes and strengthen the overall security of the organization.

Key Competencies:

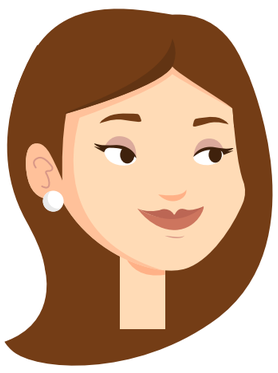
monitoring using AI tools, threat hunting, incident investigation, knowledge of programming languages, program penetration or testing.

Soft Skills:

critical thinking, analytical thinking, problem solving, and teamwork.

Education:

bachelor's degree, master's degree.



2029

MEDIA EDUCATOR

This expert helps students navigate the digital environment, including working with online resources, improving media literacy, organizing training courses, creating media projects (e.g., videos or websites), and adapting media for different groups.

Key Competencies:

improving media literacy, developing and organizing educational materials through websites, implementing and evaluating media projects.

Soft Skills:

digital and technical, critical thinking and media literacy, creativity.

Education:

micro-qualification/Minor.

2028

STEAM EDUCATOR

This expert integrates into education science, technology, engineering, art, and mathematics using a project-based, practical, and development-oriented approach—the educator of the 21st century.

Key Competencies:

integration of disciplines, designing and conducting experiments using modern technologies such as AI programming, robotics, and neural networks.

Soft Skills:

advanced knowledge, methodological skills, critical and creative thinking, technical skills.

Education:

micro-qualification/Minor.

2029

CYBER TEACHER

Cyber teacher teaches students digital hygiene and safe online behavior, helps them adapt to the digital environment and use information technology safely. A specialist who studies the patterns of personality development in the context of the integration of the real and digital worlds.

Key Competencies:

ability to work with the Ed-Tech platform and digital resources, expansion of virtual reality, teaching digital literacy, supporting cyber socialization, applying innovative methods.

Soft Skills:

critical thinking, communication skills: creativity, collaboration, problem solving, digital literacy and information literacy, leadership.

Education:

bachelor's degree, master's degree.

2028

IT TUTOR

Help students master information technology and build an individual educational path.

Key Competencies:

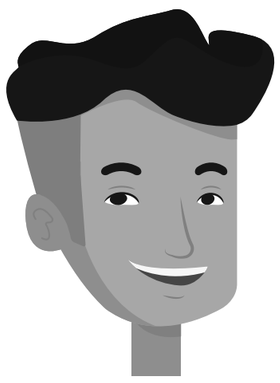
Possess in-depth technical knowledge and practical experience in IT, possess advanced communication skills and patience to find an approach to different students, continuously learn new things and follow trends to provide relevant education.

Soft Skills:

collaboration, problem solving, digital literacy and information literacy, leadership.

Education:

micro-qualification/Minor.



2033

GAME-BASED LEARNING SPECIALIST

This specialist coordinates the learning and education process and acts as a scientific and professional mentor for children. This professional develops and conducts game-based lessons aimed at making learning more engaging and accessible, contributing to the development of students' cognitive, social, and emotional skills. This profession requires a degree in education, special education, or psychology and education.

Key Competencies:

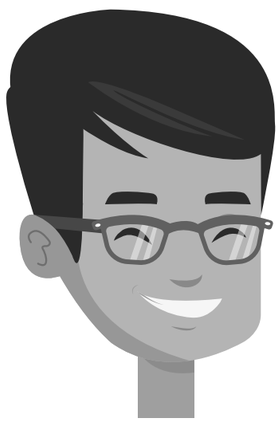
development and implementation of educational programs based on game-based learning methods, conducting classes using various games: didactic, role-playing, mobile, board games, as well as modern digital and virtual games.

Soft Skills:

critical thinking, communication skills: creativity, collaboration, problem solving, digital literacy and information literacy, leadership.

Education:

micro-qualification/Minor.



2029

DIGITAL EDUCATOR

This expert uses digital tools and technologies, AI and online platforms, educational applications and virtual tools in the educational process to improve the effectiveness of education and learning (e.g., homework is done electronically).

Key Competencies:

Proficiency in ICT and digital platforms, ability to use applications and online services; skills in working with electronic diaries, educational platforms, and social networks; use of digital tools to assess and monitor educational achievements.

Soft Skills:

digital security and ethics, creativity and flexibility, self-development.

Education:

technical and vocational education, micro-qualification/Minor.

2029

CRAFTSMAN AND ENTREPRENEURIAL EDUCATOR

An educator who teaches and trains students in the basics of entrepreneurship, how to sell their labor, and how to create mini-workshops and startups.

Key Competencies:

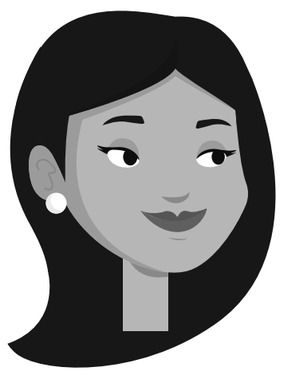
professional and organizational skills, pedagogical competencies such as result orientation, communication, learning process management, creativity, and reflection.

Soft Skills:

creative thinking, entrepreneurial marketing, advertising, digital and financial literacy.

Education:

technical and vocational education, micro-qualification/Minor.



2030

DIFFERENTIATION TEACHER

Differentiation teacher adapts tasks, methods, and pace of learning to the individual characteristics, level of preparation, and inclinations of each student. This helps each child reach their full potential while maintaining the overall learning goals for the entire class. This expert helps inclusive children learn by placing them in groups according to their intellectual level or unique abilities.

Key Competencies:

providing opportunities for deepening and systematizing knowledge, developing students' cognitive independence, equalizing knowledge and skills, creating optimal conditions for a comfortable pace of learning.

Soft Skills:

critical thinking and problem solving, creativity and flexibility, emotional intelligence, digital literacy, learning and self-expression.

Education:

technical and vocational education, bachelor's degree

TRANSFORMING PROFESSIONS

MINING AND QUARRYING: CRUDE OIL AND ASSOCIATED GAS EXTRACTION

DRILLER, ASSISTANT DRILLER → **AUTOMATED DRILLING RIG OPERATOR**

It is a specialist who operates high-tech drilling complexes equipped with robotic mechanisms, intelligent control systems, and digital sensors. This expert's work includes programming the drilling trajectory, monitoring parameters in real time, diagnosing equipment, and optimizing the production process. The profession is emerging as a result of the transition from manual drilling operations to fully automated solutions, which requires proficiency in digital interfaces, the basics of mechatronics, and technological analytics.

FIELD GEOLOGIST → **DATA GEOLOGIST**

It is a specialist who replaces field observations with a wide range of analytical work with geodata. This expert processes large arrays of geological information, build digital models of deposits, analyze 3D structures, and use GIS systems to predict formation characteristics. The profession emphasizes the role of analytics, modeling, and data interpretation, which is becoming particularly important in the context of the automation of exploration processes and the transition to digital subsoil use.

MECHANICAL ENGINEER → **INTELLIGENT EQUIPMENT AND MAINTENANCE ENGINEER**

This is a professional who ensures the operation and predictive maintenance of machines and installations equipped with status sensors, IoT systems, and artificial intelligence algorithms. Such experts analyze digital signals, configure sensor systems, predict component wear, and prevent emergencies through early detection of deviations. This profession is emerging at the intersection of engineering, digital diagnostics, and data analytics, which significantly improves the efficiency of technical maintenance.

OCCUPATIONAL SAFETY ENGINEER → **INDUSTRIAL AND ENVIRONMENTAL SAFETY ENGINEER WITH AI CONTROL**

This is a specialist who works with digital monitoring platforms, automated predictive analysis systems, and smart safety sensors. These experts assess risks in real time, simulate potential accident scenarios, monitor environmental indicators, and ensure that facility processes comply with modern safety standards. The transition to this profession is associated with the digitalization of occupational safety, environmental monitoring, and industrial safety, which requires the development of competencies in the field of artificial intelligence and data analysis.

MANUFACTURING INDUSTRY: OIL AND GAS PRODUCTS MANUFACTURING

DESIGNER/DRILLER/DEVELOPER → **BACHELOR OF OIL AND GAS/ TECHNICIAN/TECHNOLOGIST**

These are modern specialists in the field of field development and drilling replacing highly specialized job positions thanks to the expansion of competencies and the introduction of digital technologies. Process automation reduces the need for manual labor, and new production tasks require knowledge at the intersection of engineering, IT, and process control systems. The transition to modern standards of safety, environmental control, and digital monitoring requires employees to have a broad outlook, the ability to work with intelligent analysis systems, and in compliance with environmental and industrial standards. Such a specialist has universal competencies and is capable of performing a wide range of technological functions.

OPERATOR → **CONTROL ROOM OPERATOR**

This is a specialist who manages technological processes through automated control systems (ACS) and distributed control systems. This work is based on monitoring the parameters of all units of the oil refining complex — pumps, furnaces, valves, compressors — from a central control room. Production automation requires the operator to have in-depth knowledge of digital technologies, process logic, diagnostics, and real-time response to deviations.

CHEMICAL ANALYSIS LAB TECHNICIAN → **ANALYST-LAB TECHNICIAN (PETROCHEMICAL ENGINEER)**

It is a specialist who works with robotic laboratory systems, automatic analyzers, and digital platforms for controlling the quality of petroleum products. Routine operations, including sample preparation, testing, and data processing, are performed by automated equipment, which reduces the human factor and increases the accuracy of results. The role of the analyst is shifting toward data interpretation, verification of results, working with chemical models, and ensuring compliance with quality standards.

PUMP STATION OPERATOR → **REMOTE CONTROL OPERATOR (DISPATCHER ANALYST)**

It is an expert who remotely monitors and controls pump stations and other equipment using digital systems. With the introduction of IoT sensors, SCADA platforms, and analytical tools, the role of the operator is shifting from physical intervention to analyzing indicators, predicting malfunctions, and making decisions based on digital data. The profession requires competencies in digital diagnostics and remote management of technological equipment.

OCCUPATIONAL SAFETY ENGINEER → **DIGITAL OCCUPATIONAL SAFETY SPECIALIST**

It is a professional who works with automated safety control systems, digital sensors, monitoring platforms, and analytical risk models. The main task is to transition from traditional visual control to digital occupational safety management, which ensures a higher level of industrial safety. Such a specialist analyzes data in real time, predicts dangerous situations, and ensures a reduction in industrial accidents.

ENERGY ENGINEER → **ESG SPECIALIST, ENERGY EFFICIENCY ENGINEER**

The modern energy engineer is transforming into a specialist in sustainable development and energy efficiency. This person is responsible not only for the energy supply of facilities, but also for the implementation of green technologies, reducing the carbon footprint, optimizing energy consumption, and complying with international ESG standards. Such specialists assess the energy efficiency of processes, develop environmentally friendly solutions, implement renewable energy sources, and ensure that the enterprise complies with sustainable development requirements.

SYSTEM ADMINISTRATOR → **IT SPECIALIST**

Modern IT specialists are replacing the traditional role of system administrators due to the expansion of tasks related to the digitalization of the industry. They work with industrial digital platforms, automation systems, databases, industrial networks, cybersecurity, and digital twins. Skills in hardware and software integration, data analysis, and support for high-tech infrastructure in processing industries are required.

ECOLOGIST → **ECOANALYST**

It is a specialist in a new field who uses digital technologies and analytical tools to monitor the environmental performance of oil and gas companies. Such professionals work with data from sensor systems and monitoring platforms, analyze emissions, water and soil quality, predict environmental risks, and develop measures to reduce negative impacts. The profession is emerging due to the need for constant environmental monitoring and the transition to digital methods of environmental protection.

MANUFACTURING INDUSTRY: MACHINERY AND EQUIPMENT MANUFACTURING

STATION DISPATCHER → **INTELLIGENT DISPATCHER**

This is a modern specialist who manages production and transportation processes using digital platforms, automated monitoring and analytics systems. These professionals monitor equipment operation in real time, analyze sensor data, predict possible failures, and coordinate the actions of technical services. The transition to this profession is associated with the introduction of intelligent control systems that require dispatchers to have skills in technical maintenance, working with automation algorithms, and digital documentation.

TURNER, MILLER → CNC MACHINE OPERATOR

This is a specialist who works with high-precision equipment controlled by digital programs. These professionals set up machines, load control programs, monitor processing parameters, and analyze the quality of finished parts. This profession has emerged against the backdrop of equipment upgrades, automation of production processes, and the transition from manual turning and milling operations to programmable and more precise metalworking.

RIGGING OPERATOR → **LOADING AND UNLOADING COMPLEX OPERATOR**

This is a professional who manages robotic and automated cargo handling systems. This person ensures the operation of loaders, conveyors, and sensor systems, and is responsible for equipment maintenance, logistics flow optimization, and compliance with safety standards. The transformation of the rigger profession is due to the robotization of warehouse and production operations, the use of machine vision systems, and automated complexes.

OCCUPATIONAL SAFETY ENGINEER → **DIGITAL SECURITY SPECIALIST**

It is an engineer who is responsible for implementing and supporting digital solutions that ensures occupational health and safety, industrial safety, and risk prevention. Such experts use IoT sensors, video analytics systems, predictive algorithms, and digital platforms to monitor equipment status and working conditions. The transition from the traditional role of a safety engineer is driven by the need to manage automated control systems, analyze data, and ensure proactive safety for personnel in high-tech manufacturing environments.

MANUFACTURING INDUSTRY: FOOD PRODUCTION

MARKER → **OPERATOR**

It is a specialist who ensures the automated application, reading, and control of identification marks on products and packaging. These people operate equipment, calibrate sensors and quality control cameras, and monitor the accuracy of barcodes, serial numbers, release dates, and expiration dates. The professional is responsible for integrating labeling data into the company's digital systems and preventing errors that affect product safety and traceability.

TASTER → **QUALITY MANAGER**

This is a specialist responsible for the functioning of the food quality and safety management system. This role goes beyond tasting and includes monitoring product compliance with sanitary norms, safety standards, labeling and certification requirements. He or she organizes audit processes, risk monitoring, implementation of corrective actions, and continuous improvement of technological processes.

ENGINEER OPERATOR → **DIGITAL TECHNOLOGIST**

This is a new generation engineer who develops and implements digital tools to optimize production processes. He works with data, models, sensor systems, and AI algorithms, ensuring the transition from traditional operational management to predictive management based on analytics and modeling. The specialist integrates production lines with IT systems, provides analysis of technological parameters, digital traceability, reduction of losses, and increased efficiency.

PACKAGER → **ROBOTIC PACKAGING LINE OPERATOR**

Специалист, управляющий автоматизированными и роботизированными модулями упаковочного производства. Он обеспечивает настройку роботов, контроль качества упаковки, стабильность работы линий и оперативное устранение сбоев. Профессия ориентирована на управление высокотехнологичным оборудованием, обеспечивающим точность, единообразие и высокую скорость упаковочных операций.

PACKAGING LINE OPERATOR → **PRODUCTION PLANNING AND LOGISTICS ENGINEER**

This is a specialist responsible for creating production schedules, managing inventory, analyzing capacity utilization, and optimizing material flows. These professionals ensure the smooth operation of packaging and processing lines, interact with the supply and logistics departments, forecast raw material requirements, and monitor the implementation of production plans. The profession is emerging against the backdrop of increasingly complex supply chains and the need for accurate planning in automated production environments.

PRODUCTION SHIFT MANAGER → **PROJECT MANAGER FOR DIGITALIZATION AND INNOVATION IN PRODUCTION**

This is a manager who is responsible for developing, implementing, and supporting innovative and digital solutions at production sites. He or she coordinates the implementation of new technologies (AI, robotics, IoT, MES systems), manages cross-functional project teams, evaluates the effectiveness of solutions, and ensures the transformation of production processes. This role involves a transition from operational shift management to strategic leadership in the field of innovation.

CONSTRUCTION

FOREMAN → **DIGITAL CONSTRUCTION COORDINATOR (BIM MANAGER)**

A specialist is responsible for implementing and supporting building information modeling (BIM) technologies at all stages of a project. They ensure the coordination of digital models between architects, engineers, and contractors, control data quality, manage the life cycle of the object in a digital environment, and optimize construction processes. The profession is emerging against the backdrop of the industry's transition to digital management, design automation, and the need for comprehensive coordination of construction participants.

ARCHITECT → **DIGITAL ARCHITECT (WITH AI-BASED DESIGN)**

A specialist who uses artificial intelligence, parametric modeling, and digital tools to develop architectural concepts. These professionals apply generative design, optimization algorithms, and neural network solutions to create functional, energy-efficient, and aesthetically balanced objects. The profession is emerging amid architecture's transition to digital technologies, which significantly accelerate the design process and improve the accuracy of solutions.

COST ESTIMATOR → **QUANTITATIVE ESTIMATOR.**

This is a professional who conducts detailed cost analysis of construction projects based on digital data, BIM models, and artificial intelligence tools. This person is responsible for calculating work volumes, controlling budgets, assessing risks, preparing financial forecasts, and optimizing costs at all stages of the project. The use of AI speeds up the processing of large data sets and increases the accuracy of financial calculations.

CONSTRUCTION TECHNICIAN → **CONSTRUCTION ROBOT OPERATOR**

This is a specialist who operates robotic equipment, drones, and autonomous construction machines. Construction robot operator configures software routes, monitor the execution of robotic operations, analyze navigation system data, and provide equipment maintenance. This profession is becoming increasingly in demand due to the automation of construction processes, the introduction of robotics, and the use of unmanned technologies on construction sites.

BRICKLAYER → **3D CONSTRUCTION PRINTER OPERATOR**

This is a professional who operates equipment for the additive manufacturing of building elements and structures. This specialist prepares digital models, configure printing parameters, controls layer quality, optimizes material consumption, and provides printer maintenance. 3D printing allows for the manufacture of walls, large blocks, and structural elements, serving as a modern alternative to traditional masonry and opening up opportunities for accelerated and economical construction.

TRANSPORTATION AND WAREHOUSING

AUTO ELECTRICIAN → **ELECTRICAL AND DIGITAL EQUIPMENT DIAGNOSTICS SPECIALIST**

This profession reflects global trends in technological transformation in the field of logistics. As vehicles and warehouse equipment become highly automated, the traditional functions of an auto electrician are evolving towards more complex and specialized competencies that require the integration of knowledge in the fields of electronics, programming, and digital control systems.

DRIVER → **AUTONOMOUS DRIVING SYSTEMS OPERATOR**

The traditional role of a driver who directly controls a vehicle is transforming into that of a specialist who remotely monitors and controls a fleet of autonomous vehicles. This specialist coordinates, monitors, and intervenes in the operation of intelligent transportation systems using modern digital technologies and communication tools.

MECHANIC → **ELECTRONIC SYSTEMS DIAGNOSTICS ENGINEER**

Modern trends in technical development have led to the gradual replacement of traditional mechanical systems, such as hydraulic and pneumatic drives, with their electronic and digital counterparts. This shifts the requirements for specialists: mechanical skills are no longer the priority, but rather the ability to work with high-precision diagnostic equipment, software, and electronic control systems.

ACCOUNTANT → **FINANCIAL ANALYST**

Previously, the work of an accountant was largely associated with performing routine operations such as manual data entry, document reconciliation, account processing, and standard reporting. However, modern digital solutions have radically changed the nature of this work. The role of a financial analyst is shifting towards data interpretation, strategic analysis, and financial modeling. Such a specialist is responsible for assessing financial indicators, forecasting cash flows, analyzing risks, monitoring the effectiveness of business processes, and generating analytical reports for management decision-making. They work with digital platforms, BI systems, large data sets, and analytics algorithms, ensuring increased accuracy, speed, and depth of financial analysis.

CONDUCTOR → **TRANSPORTATION SERVICE SPECIALIST**

The process reflects the transition from performing repetitive, routine tasks to managing complex, integrated transport and logistics systems. With the development of automation and digital technologies, the traditional role of a conductor is transforming into a multifunctional and technology-oriented profession. Transport service specialists in the West Kazakhstan region will operate within a comprehensive logistics ecosystem, where the key priorities are not only passenger comfort and safety, but also the efficiency, speed, and reliability of freight transportation.

SUPPLIER → **SUPERVISOR**

This transformation reflects the evolution of the professional role of specialists in the context of digitalization, automation, and the increasing complexity of logistics processes. The functions of a supply chain specialist are shifting from performing routine operations to strategic management of material flows and interaction with digital supply ecosystems.

HR SPECIALIST → **HR MANAGER**

The process reflects the transition from the traditional administrative and executive role of a personnel specialist to strategic human resource management. With the automation of logistics processes and a shortage of qualified personnel, the functions of an HR specialist are becoming more complex and analytical, covering both personnel development and the optimization of labor resources in line with the long-term goals of the organization.

AGRICULTURE, FORESTRY, AND FISHERIES

ACCOUNTANT → **OPERATIONS ANALYST**

This professional transitions from manual accounting to digital analysis and data-driven management decisions. The role is becoming more strategic and technology-oriented, reflecting modern business requirements for operational efficiency and digital transformation.

ZOOTECHNICIAN → **ZOOTECHNICAL ENGINEER**

It implies the transition from traditional animal observation to engineering management of livestock production processes using digital technologies and biotechnologies.

MECHANIC → **MAINTENANCE AND AUTOMATED SYSTEMS ENGINEER**

This profession is driven by the emergence of smart and automated machines in agriculture, forestry, and fisheries; the need not only to repair equipment, but also to diagnose, optimize, and manage automated systems; the introduction of digital sensors, sensors, and monitoring systems that require new knowledge and skills.

SEED PRODUCTION → **SEED PRODUCTION AND DIGITAL AGROTECHNOLOGY ENGINEER**

The emergence of genetically improved varieties, biotechnologies, and digital crop monitoring systems; the need to control seed quality and optimize production and storage processes using modern technologies; the emergence of analyzers, sensors, and record systems that require engineering and digital skills all drive the transition to this profession.

AGRONOMIST → **DIGITAL AGRONOMIST**

This profession change is driven by the emergence of digital technologies, satellite monitoring, drones, and sensor systems in agriculture; the need to analyze large amounts of data on soil, plant, and crop conditions for management decisions.

ICHTHYOLOGIST → **ICHTHYOPATHOLOGIST**

This profession change is driven by the emergence of biotechnology, molecular diagnostic methods, and digital monitoring of aquatic ecosystems, the need not only to study fish species, but also to monitor health and prevent diseases that affect aquaculture productivity. The role is becoming more practice-oriented, analytical, and technology-driven, with an emphasis on sustainable fish farming and biosafety.

FISHERIES AND INDUSTRIAL FISHING SPECIALIST → **AQUACULTURE SPECIALIST**

It is a shift in the industry from traditional commercial fishing to sustainable and managed production of aquatic resources; transition from working with traditional ultra-high zone (UHZ) incubators to artificial breeding and high-tech incubation; emergence of aquaculture as a high-tech field, including control of the habitat, feeding, and health of fish using digital and biotechnologies.

LOGGER → **FORESTRY MACHINE OPERATOR**

It is a transition from manual logging to automated and high-tech logging systems; introduction of modern technology with automatic control, navigation, and monitoring systems, which increases the efficiency and safety of work; manual logging and young tree care are replaced by the control of automated logging machines; digital systems allow for more efficient and safer control of logging, young tree care, and wood sorting.

ECOLOGY AND NATURAL RESOURCE MANAGEMENT → **NATURAL RESOURCE ECO-ANALYST**

This transition results from the emergence of digital technologies for monitoring the state of ecosystems; the need to analyze data on soils, water bodies, forests, and biological resources for sustainable nature management. The role of the specialist is shifting from observation and reporting to analysis, forecasting, and data-driven decision-making.

FOREST RESOURCES AND FORESTRY → **DIGITAL FORESTER**

It is a transition from traditional forest accounting and maintenance to digital forest management; introduction of drones, GIS, sensor systems, and automated monitoring to track forest health, tree growth, and ecosystem status; the need to analyze data and make management decisions based on digital information, rather than relying solely on visual inspection and manual labor.

EDUCATION

EDUCATIONAL ORGANIZER → **PRESCHOOL TEACHER**

This is a specialist who ensures the development of basic skills and readiness of children for primary school education. These experts integrate modern early development methods, form social, cognitive, and communication skills, and interact with parents and support specialists. This profession strengthens the role of the preschool section of the school against the backdrop of staff optimization and allows for individualized support for children before they enter first grade.

TRANSLATOR → **CULTURAL-SYNCHRONOUS TRANSLATOR.**

This is a professional who combines in-depth intercultural expertise with simultaneous interpreting skills. With the widespread use of automated and neural network translators, their role is shifting towards ensuring accuracy of meaning, cultural context, neutrality of statements, and adaptation of content to the national characteristics of the audience. Such specialists are needed in diplomacy, international business, humanitarian projects, and areas where not only linguistic but also cultural competence is required.

SOCIAL WORKER → **INCLUSIVE EDUCATION TEACHER/SPORTS INSTRUCTOR**

It is a specialist who provides support to students with special educational needs, adapts teaching materials, develops individual learning paths, and interacts with an interdisciplinary team (speech therapists, defectologists, psychologists). This profession is in demand due to the growing number of inclusive students and the need to improve the quality of support. A sports instructor is a professional who works on developing physical skills, forming healthy habits, and preventing diseases, which is becoming increasingly relevant in the educational environment.

METHODOLOGIST → **INNOVATIVE EDUCATOR**

This is a specialist who implements modern educational technologies, digital tools, interactive and research teaching methods. These experts develop innovative educational solutions, support teaching staff in the process of change, and ensure the improvement of education quality through experimental and adaptive approaches. The profession is emerging against the backdrop of schools' transition to new teaching standards, digital transformation, and growing demands for educational effectiveness.

LIBRARIAN → **DIGITAL LIBRARIAN**

It is a modern information resource manager who manages electronic collections, digital databases, multimedia collections, and remote access platforms. These specialists are responsible for organizing digital archives, metadata, automated cataloging, and working with electronic reading systems. The profession is transforming as library processes are digitized and libraries are becoming centers of digital literacy and information navigation.

DIETITIAN → **DIETITIAN-NUTRITIONIST**

This is a specialist who combines knowledge in the fields of clinical dietetics, nutrigenetics, nutritional biochemistry, and healthy lifestyle counseling. This expert develops personalized nutrition programs, conducts dietary assessments, analyzes clients' health, and forms individual recommendations based on current scientific data. This profession is in demand in medical institutions, sports centers, health schools, and the wellness industry.

DISAPPEARING PROFESSIONS

MINING AND QUARRYING: EXTRACTION OF CRUDE PETROLEUM AND ASSOCIATED GAS

PRODUCTION OPERATORS

Reason: the automation of oil and gas extraction processes, the introduction of intelligent monitoring systems, sensors, unmanned solutions, and remote control centers are gradually eliminating the need for a constant human presence at the well. Most operations related to adjustment, parameter control, and equipment diagnostics are performed automatically or remotely, reducing the need for traditional manual operators.

Term: 2029

Evolving Profession: Мастер (оператор) по управлению (контролю) процессом добычи.

MANUFACTURING INDUSTRY: PRODUCTION OF OIL AND GAS REFINING PRODUCTS

TIMEKEEPER

Reason: Automation of personnel records, the introduction of electronic timesheets, biometric time tracking systems, integration of ERP/HRM platforms, and automatic employment calculations make manual timesheet management obsolete. Most operations are performed by software solutions without human involvement

Term: 2028.

Evolving Profession: Digital HR specialist

EQUIPMENT INSPECTORS

Reason: They will disappear due to the development of digital technologies, which have replaced physical inspections with remote monitoring.

Term: 2028.

Evolving Profession: Dispatchers

SAMPLERS

Reason: introduction of robotic systems for automatic sampling minimizes the need for manual labor. Such systems ensure high accuracy and sampling frequency, which is impossible with a manual approach.

Term: 2030.

Evolving Profession: Eco-analysts

DOCUMENT CONTROLLERS

Reason: The disappearance of the traditional profession of document management specialist in the oil and gas processing industry is due to large-scale digitization, automation, and the transition to integrated information systems.

Term: 2027

Evolving Profession: HR specialist.

DRAUGHTSMAN/CARTOGRAPHER

Reason: The disappearance of the traditional profession of draftsman and cartographer in the oil and gas processing industry is due to the development and widespread introduction of automated and digital technologies. Manual labor and two-dimensional design are giving way to intelligent systems capable of creating complex three-dimensional models and analyzing spatial data.

Term: 2029

Evolving Profession: Automated design engineer.

PROCESS PLANT OPERATOR

Reason: automation, digitalization, and the introduction of integrated production management systems.

Term: 2030.

Evolving Profession: Automated process control system (APCS) operator

CHEMICAL ANALYSIS LAB TECHNICIAN

Reason: The disappearance of the traditional profession of chemical analysis laboratory assistant in the oil and gas processing industry is due to the large-scale automation of laboratory processes and the integration of digital technologies. Routine manual operations are giving way to intelligent systems capable of performing real-time analysis with the highest accuracy.

Term: 2030.

Evolving Profession: Quality control specialists (laboratory analysts).

AUTOMATION AND MECHANIZATION ENGINEER

Reason: The disappearance of the profession of automation and mechanization engineer in the oil and gas processing industry is due to its evolution and fragmentation into more narrow and specialized innovative roles. With the development of digital technologies, AI, and robotics, the tasks of this engineer have gone far beyond traditional mechanization and automation, requiring new, deeper competencies.

Term: 2030.

Evolving Profession: Instrumentation and control engineers.

REPAIR MECANIC

Reason: The profession of repair mechanic is gradually disappearing due to the high level of automation and robotization of production processes in oil and gas processing. Modern equipment is equipped with self-diagnostic and remote control systems, which reduces the need for manual repair and maintenance, replacing traditional job functions with digital and engineering competencies.

Term: 2029.

Evolving Profession: Equipment condition monitoring engineers.

MANUFACTURING INDUSTRY: MACHINERY AND EQUIPMENT MANUFACTURING

MANUAL MACHINE OPERATORS

Reason: The emergence and widespread adoption of automated machine tools with numerical control (CNC), robotic production lines, and automatic equipment adjustment systems are making manual machine tool operation less in demand..

Term: 2029

Evolving Profession: CNC operators.

TECHNICAL CONTROL DEPARTMENT OPERATOR (MANUAL INSPECTION)

Reason: Inspection and quality control are gradually shifting to automated systems: sensors, high-resolution cameras, machine vision systems, and defect recognition algorithms provide more accurate and consistent inspection than manual visual inspection.

Term: 2029.

Evolving Profession: Industrial visual inspection (machine vision) specialist.

WAREHOUSE CLERK (MANUAL ACCOUNTING)

Reason: With the introduction of automated warehousing and logistics systems—electronic accounting, RFID tags, scanners, robotic forklifts, and warehouse management systems (WMS)—the need for manual accounting and traditional storekeeper work is significantly reduced.

Term: 2029.

Evolving Profession: Digital logistics and warehouse systems specialist (WMS operator).

SANDBLASTER

Reason: automation of cleaning and surface preparation processes using robotic sandblasting equipment and cross-equipment reduces the need for manual labor. Modern systems are more accurate, safer, and provide consistent processing quality.

Term: 2029.

Evolving Profession: Automated sandblasting machine operator.

ELECTROPLATING SPECIALIST

Reason: The emergence of automated electroplating lines, robotic painters, and stricter safety requirements (hazardous working conditions) are reducing the need for manual electroplating.

Term: 2029.

Evolving Profession: Operators of automated electroplating lines.

THERMIST

Reason: The introduction of digital modeling, 3D models of technological processes, IT forecasting systems, and automated thermal equipment are reducing the need for manual heat treatment control.

Term: 2031.

Evolving Profession: Automated heat treatment systems specialist

MANUFACTURING INDUSTRY: FOOD PRODUCTION

SALESPERSON

Reason: introduction of automation and digitalization: robotics, conveyor lines, automated dosing and quality control systems reduce the need for manual labor by salespeople/shift representatives in production.

Term: 2030.

Evolving Profession: In-plant sales and supply coordination specialist, Cashier or floor manager, Consultant.

COMMODITY EXPERT

Reason: The reason for the "disappearance" of the commodity expert in the food industry lies not in the disappearance of the profession itself, but in the evolution of this function. Instead of a separate specialist, quality control and inventory management tasks are now often integrated into process management and the responsibilities of other departments, such as quality control, technology, and purchasing and supply management.

Term: 2028.

Evolving Profession: Quality manager (food quality control).

SORTER

Reason: disappearing due to automation. Robots and automated systems are capable of sorting faster and with fewer errors than humans. Constant technological developments in agriculture and the food industry are leading to the emergence of new, more sophisticated machines that are replacing outdated methods.

Term: 2028.

Evolving Profession: Goods receiver, Logistics specialist.

PACKER

Reason: automation, which is replacing manual labor with machines. Instead of manual packaging and weighing, automatic packaging lines and possibly robots are used, which makes production faster and cheaper but reduces the need for manual labor in this operation.

Term: 2028.

Evolving Profession: Quality control inspector, Equipment maintenance specialist.

PICKER-PACKER

Reason: The profession of packer is disappearing due to the automation of production processes and the emergence of new technologies that replace manual labor. Robotic packaging and stacking systems are becoming faster and more cost-effective, leading to a reduced need for specialists who perform these tasks manually.

Term: 2028.

Evolving Profession: Labeler, Mechanic, Equipment specialist.

CONSTRUCTION

BRICKLAYER

Reason: The widespread use of 3D construction printers and robotic wall-building systems is making manual bricklaying less in demand.

Term: 2030.

Evolving Profession: 3D construction printer operator

PAINTERS AND PLASTERERS (MANUAL LABOR)

Reason: The transition to automated painting and plastering systems and robotic coating systems is reducing the need for manual specialists.

Term: 2030.

Evolving Profession: Automated finishing system operator.

CONCRETE WORKERS (TRADITIONAL)

Reason: transition to industrial technologies of prefabricated construction, 3D-printed concrete, automated mixing and casting systems are making the manual labor of concrete workers obsolete.

Term: 2030.

Evolving Profession: Concrete robotic complex operator.

MASTER BUILDERS (MANUAL LABOR)

Reason: The widespread use of BIM technologies and automated design systems is replacing manual design.

Term: 2029.

Evolving Profession: BIM coordinators.

APPRAISERS (TRADITIONAL)

Reason: digitization of calculations and the introduction of software packages for automatic estimation and cost calculation are making the traditional work of appraisers obsolete without digital skills.

Term: 2030.

Evolving Profession: Digital systems assessment engineer.

CRANE OPERATORS (TRADITIONAL)

Reason: The introduction of remotely controlled and fully automated crane systems makes manual crane operation less in demand.

Term: 2030.

Evolving Profession: Automated lifting system operator-dispatcher.

TRANSPORTATION AND WAREHOUSING

DISPATCHER

Reason: due to a combination of factors, the main one being the rapid development and introduction of digital technologies and automation systems. Artificial intelligence provides the ability to process and analyze large amounts of data in real time — at a level unattainable by human capabilities.

Term: 2028.

Evolving Profession: Autonomous driving system operator, Intelligent systems management expert.

LINE CONTROLLER

Reason: due to a combination of factors, including the active development and implementation of digital technologies, process automation, and growing demands for efficiency and transparency in logistics operations. The introduction of automated weight and size control stations significantly improves the accuracy and speed of inspections, making manual control largely redundant.

Term: 2027.

Evolving Profession: Data analysts, IT maintenance specialists.

BUS INSPECTOR

Reason: associated with the active introduction of modern technological solutions that make manual checks irrelevant, ineffective, and redundant. Similar to other cities in Kazakhstan, public transport in Uralsk is equipped with validators that enable cashless payment for travel using a transport card, bank card, or mobile devices.

Term: 2026.

Evolving Profession: Operators of validators, QR codes, and remote monitoring systems.

LOADER AND PACKER

Reason: Loading, unloading, sorting, and packaging operations, which were previously performed manually, are gradually being replaced by automated conveyor lines, robotic manipulators, and intelligent cargo transportation systems.

Term: 2028.

Evolving Profession: Logistics specialist and supply chain analyst.

WAREHOUSE WORKER AND ORDER PICKER

Reason: In automated warehouses, order picking processes are significantly more accurate and faster than manual operations. The use of artificial intelligence and modern warehouse management systems ensures control over inventory and the movement of goods, minimizing human involvement.

Term: 2030.

Evolving Profession: Digital warehouse operator.

AGRICULTURE, FORESTRY, AND FISHERIES

STOCKMAN

Reason: Replacement of manual labor with technical means of animal monitoring and automation of feeding and livestock maintenance processes.

Term: 2029.

Evolving Profession: Video surveillance operator / feed distribution vehicle operator.

AGRICULTURAL ECONOMIST

Reason: Companies are reducing the size of their economic and accounting departments, switching to automated accounting, analysis, and forecasting systems.

Term: 2030.

Evolving Profession: Financial accountant.

PLANNER

Reason: The widespread adoption of digital planning, production automation, and resource management systems has made manual planning obsolete.

Term: 2029.

Evolving Profession: Process engineer.

AGRICULTURAL CHEMIST

Reason: The emergence of digital field monitoring systems, drones, and sensor technologies that automatically assess the condition of plants, soil, and fertilizer requirements.

Term: 2030.

Evolving Profession: Agronomist-biotechnologist.

SLAUGHTERHOUSE WORKER

Reason: Job cuts at enterprises due to the automation of slaughter lines and processing.

Term: 2028.

Evolving Profession: Workers.

WEIGHER

Reason: The introduction of automated and digital weighing systems capable of accurately recording product weight and transmitting data to accounting platforms.

Term: 2029.

Evolving Profession: Laboratory assistant-analyst for automated weighing systems

LOGGER

Reason: Introduction of automated logging machines and digital forest management systems.

Term: 2030.

Evolving Profession: Harvester operator.

ICHTHYOLOGIST

Reason: The integration of animal and aquatic ecosystem sciences makes narrow specialization less in demand — the modern industry requires a comprehensive analysis of ecosystems.

Term: 2030.

Evolving Profession: Zoologist (by branch).

MILKMAID

Reason: The introduction of robotic milking systems and automated cattle care, which control the milking process and monitor animal health.

Term: 2028.

Evolving Profession: Robotic milking machine operators.

LOADER

Reason: The introduction of robotic loading and unloading systems, automatic stackers, and conveyors, reducing the need for manual labor.

Term: 2029.

Evolving Profession: Loading operator.

EDUCATION

SELF-AWARENESS TEACHER

Reason: the subject «Self-Awareness» was removed from the school curriculum and the State Educational Standard in 2022. As a result, it can now be taught only as an elective course, depending on the school's choice.

Term: 2023.

Evolving Profession: Retraining (Advisor/Coach).

TEACHER OF FINE ARTS AND DRAFTING

Reason: According to the model curriculum for primary education, the subjects were renamed «Labor Education» and «Fine Arts» and in 2023 the corresponding educational programs were removed from the national registry.

Term: 2023.

Evolving Profession: Designer-teacher /Instructor of 3D modeling (CAD systems).

CRITICALLY SHORT PROFESSIONS

Mining And Quarrying: Crude Oil And Associated Gas Extraction

Where needed: Oil and gas production companies.

- Hydrogen energy engineer
- Digital oil and gas engineer
- ESG manager
- Automation and robotics engineer at oil fields
- Environmental monitoring technician
- Fault analysis engineer
- Predictive Maintenance Data Scientist (PdM Data Scientist)
- Ecoanalyst
- Environmental Technologist
- Engineer for new composite materials
- Artificial intelligence (AI) lawyer
- Engineering safety specialist
- Oil and gas procurement specialist
- Oil and gas industry lawyer
- Petrochemical engineer

Manufacturing industry: Production of oil and gas refining products

Where needed: Manufacturing enterprise (manufacturing industry).

- Blockchain technology specialist in oil and gas logistics
- Robotics technician in the oil and gas industry
- Artificial intelligence (AI) specialist in the oil and gas industry
- Instrumentation and control engineer
- Instrumentation and control technician
- Digital quality control specialist
- Eco-analyst
- Specialist in the integration of innovative technologies in oil and gas chemistry (integration engineer)

Manufacturing industry: Production of machinery and equipment

- NDT flaw detector / non-destructive testing specialist
  Where needed: industrial production.
- Reverse engineer
  Where needed: Industry and engineering.
- Design engineer
  Where needed: Industry and engineering.
- Big Data Analyst
  Where needed: IT and internet services.
- Cybersecurity specialist
  Where needed: defense agencies and industrial enterprises.
- Инженер-диагност
  Where needed: Industrial enterprises.

Manufacturing industry: Food production

- Technologies in food production
  Where needed: flour milling and meat processing industries.
- Programmer for automated systems maintenance
  Where needed: industrial complexes.
- Logistics manager
  Where needed: industrial complexes, grain elevators.
- Equipment operators
  Where needed: industrial complexes, grain elevators
- Production line operator
  Where needed: factories, elevators.
- Electrician-welder
  Where needed: industrial complexes.

Construction

Where needed: construction.

- Engineers for improving the energy efficiency of buildings
- Construction data management specialists (BIM, Big Data)
- Experts in green and environmentally friendly materials
- Smart Home system engineers
- Construction robot maintenance and calibration technicians
- Digital surveyors and drone operators

Transportation and warehousing

- Motor grader operator
  Where needed: Road construction and repair, industrial and civil construction.
- Auto mechanic
  Where needed: vehicle fleets and taxi companies.
- Truck crane operator
  Where needed: Construction and industrial companies.
- Bulldozer operator
  Where needed: in construction and road works.
- Bus driver (electric bus)
  Where needed: vehicle fleet.
- Auto electrician
  Where needed: vehicle fleets and taxi companies.
- IT specialist in the transport sector
  Where needed: information security companies
- UAV specialist
  Where needed: companies involved in the design and construction of roads and transport facilities, agriculture, construction, forestry, energy, and geodesy.
- Design engineers in DTS
  Where needed: companies involved in the design and construction of roads and transport facilities.

Agriculture, Forestry, and Fisheries

- Agro-industrial UAV operator
  Where needed: Agriculture (agribusiness)
- Eco-analyst
  Where needed: Agriculture, forestry, and fisheries (agribusiness).
- Quality and sustainable development manager for agricultural production
  Where needed: Agriculture, forestry, and fisheries (Agribusiness).
- Agricultural complex operator-technologist
  Where needed: Agriculture, forestry, and fisheries (agribusiness).
- Loading operator
  Where needed: Agriculture, forestry, and fisheries (agribusiness).
- Automated logging machine operator
  Where needed: Forestry (agricultural industry).

Education

- Career counselor
  Where needed: Schools.
- Artificial intelligence specialist
  Where needed: Educational institutions.
- Cybersecurity educator
  Where needed: educational institutions.
- IT tutor/digital educator
  Where needed: educational institutions.
- Digital librarian
  Where needed: libraries.
- Differential diagnosis specialist
  Where needed: psychological, medical, and pedagogical commissions (PMPC).

PROFWISE.KZ - CAREER GUIDANCE FOR THE PROFESSIONS OF THE FUTURE

ProfWise.kz

is a digital career guidance platform designed to conduct professional diagnostics among schoolchildren and young people in Kazakhstan. The platform was developed to promote informed choices about professions, educational paths, and career trajectories based on scientifically proven methods and analysis of participants' individual characteristics.

The platform integrates internationally recognized career guidance methods (RIASEC, MBTI, Big Five, etc.) and is adapted to the current conditions of the Kazakhstani labor market.

Based on the test results, an individual report is generated, including:

• personality type and professional interests;

• recommended areas of activity;

• a list of professions and training areas that match the participant's profile;

• guidelines for further education and professional development.

ProfWise also contains advanced analytical modules that allow educational institutions and regional education authorities to obtain summary statistics on the professional inclinations of students, which contributes to:

• improving career guidance;

• planning educational pathways;

• the formation of a personnel training strategy that takes into account the demands of the labor market.

Additional platform features:

1. A section with recommendations on universities in Kazakhstan. The platform contains a section with up-to-date information on universities in the Republic of Kazakhstan and areas of study. The report shows participants universities that match their profile, as well as analytics on last year's admission scores for state grants. This helps students and parents realistically assess their chances of admission and choose the best university and educational program.
2. The "Labor Market" section. This section displays current statistics on professions and salary levels in Kazakhstan, from minimum to maximum values. The data is updated in real time based on open sources, including the hh.kz platform. This section allows students to correlate their career interests with the real situation on the labor market and make a more informed choice.
3. Administrative panel for career counselors and teachers. Specialists are provided with administrative access, allowing them to:

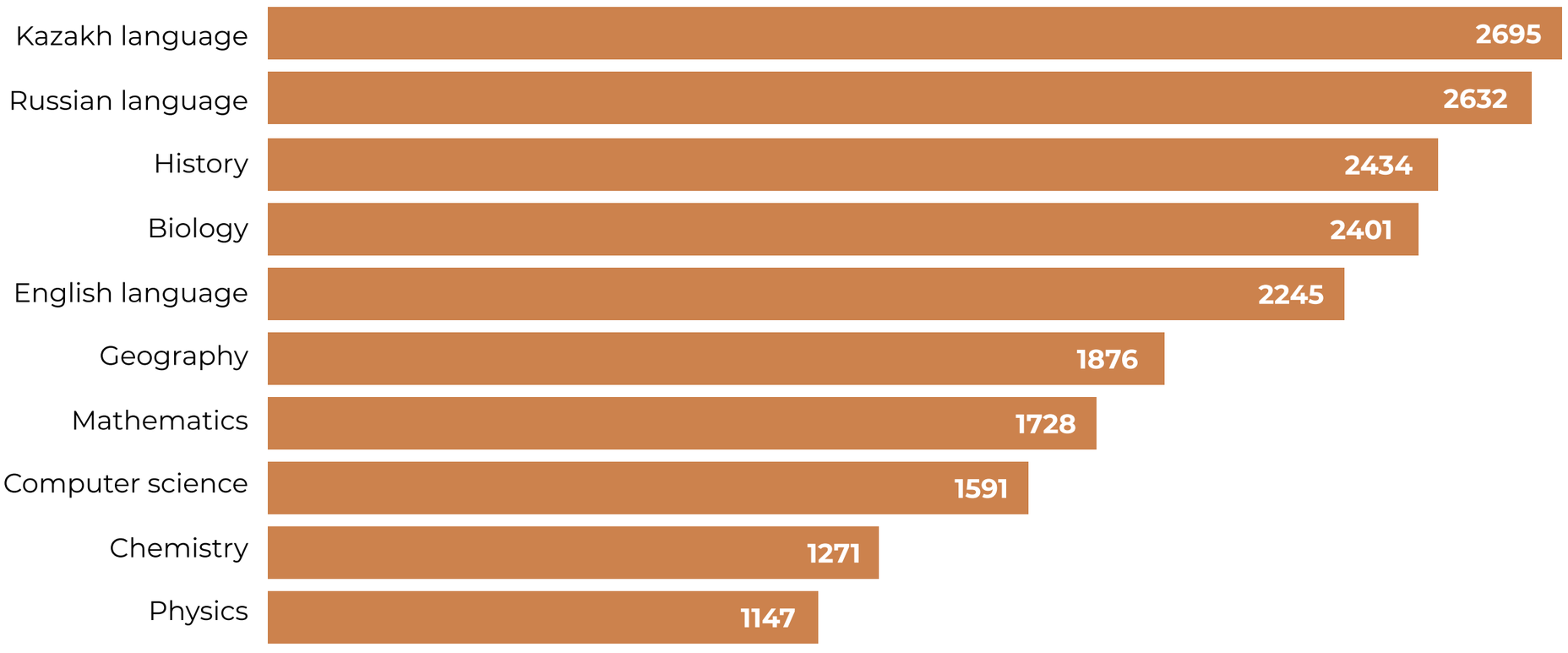
- • track which students have taken the test;
- • view the results and profiles of participants;
- • download statistics by class, school, and region;
- • generate reports for analysis and planning of career guidance work.

A total of 8,622 students from 264 schools across the region took part in the survey as part of the career guidance project in West Kazakhstan Region.

During the survey, students were asked a series of questions related to their plans for further education, their ideas and wishes, as well as their level of awareness regarding future education and careers.

The questions in the questionnaire were deliberately formulated in a free, informal manner. This approach creates a more trusting and comfortable atmosphere for students when completing the survey. Simple and familiar wording helps to reduce anxiety and encourages students to perceive the process not as an exam or test, but as a friendly conversation aimed at self-determination. This, in turn, increases the sincerity and reliability of the answers, reflecting the real interests, preferences, and plans of the students.

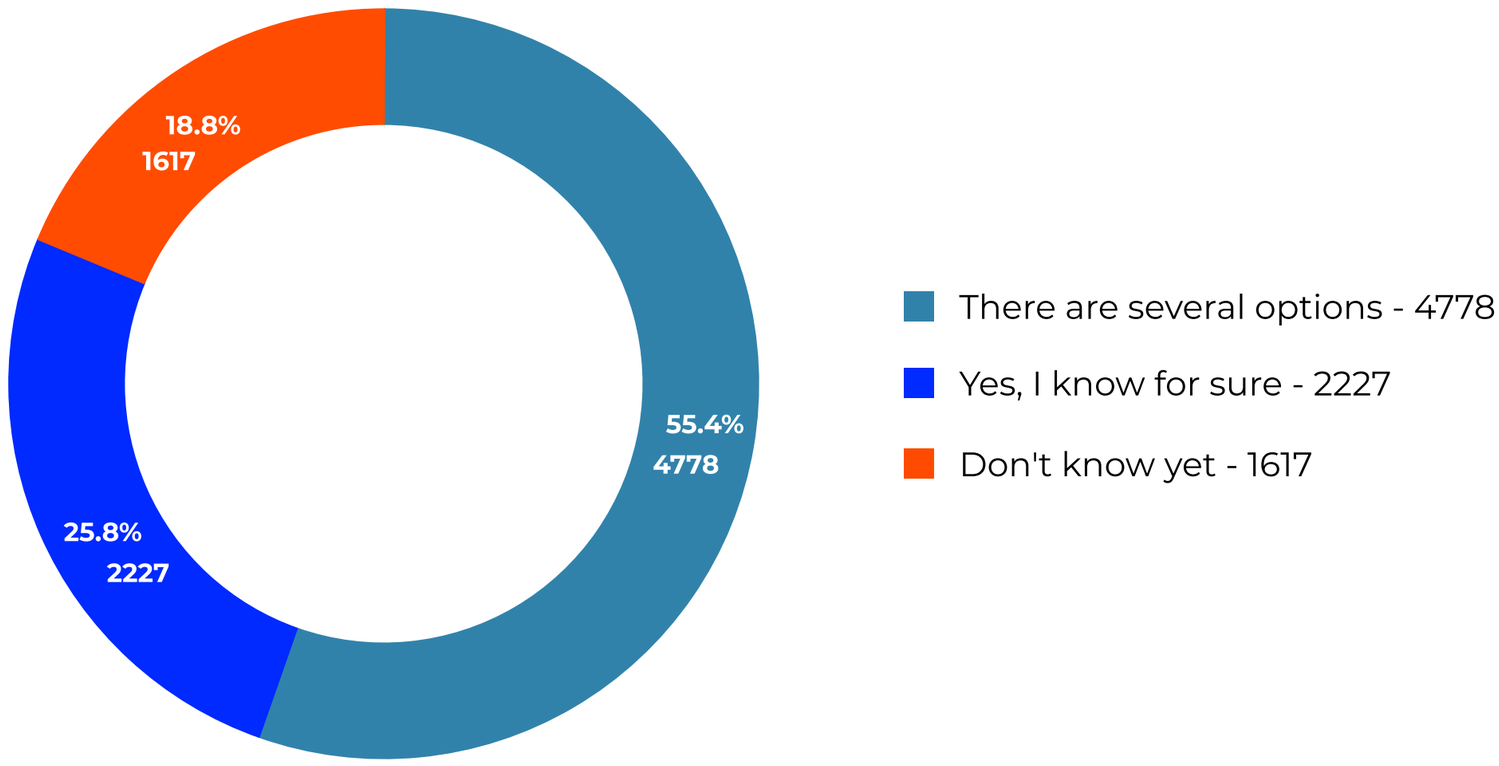
Ranking of subjects with the best academic performance



The leading subjects in terms of the number of mentions by students were Kazakh and Russian languages. Next were history, biology, and English. Physics and chemistry were the least mentioned subjects, which may indicate that students find these disciplines more difficult to understand or that they lack motivation to study the exact sciences.

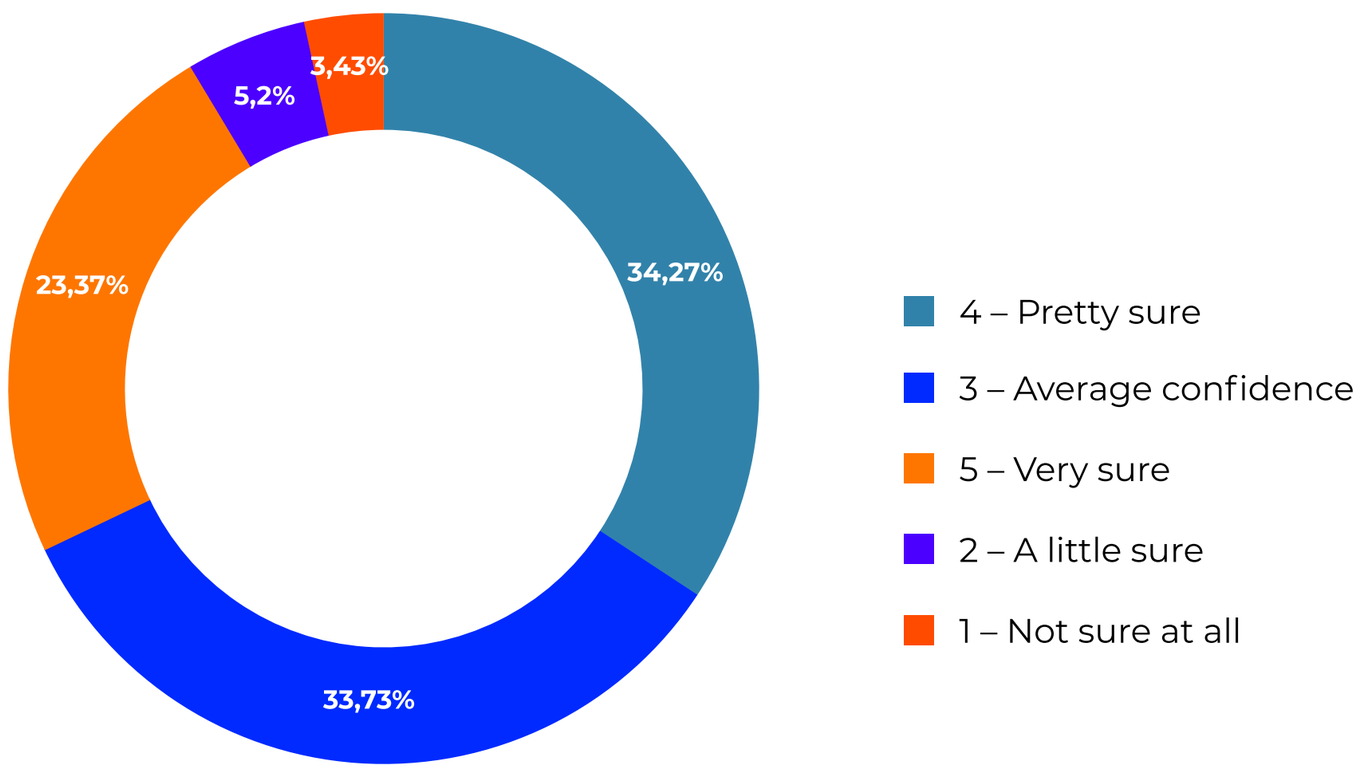
These results underscore the importance of further work to develop interest in the exact and natural sciences. It is recommended to intensify career guidance activities, including practical classes, demonstrations of career prospects in engineering and scientific fields, and the use of the ProfWise platform to visually present in-demand professions and educational trajectories. This approach could contribute to a more balanced distribution of student interest between the humanities and the exact sciences.

Distribution of respondents by decision on future profession



Only a quarter of students have a clear idea and goal regarding their future profession. Almost 20% do not have a clear vision of their future profession at the time of the survey. The majority of respondents (over 55%) are considering several options, which indicates openness to different directions and the absence of a final choice.

Distribution of respondents by degree of confidence in their career choice

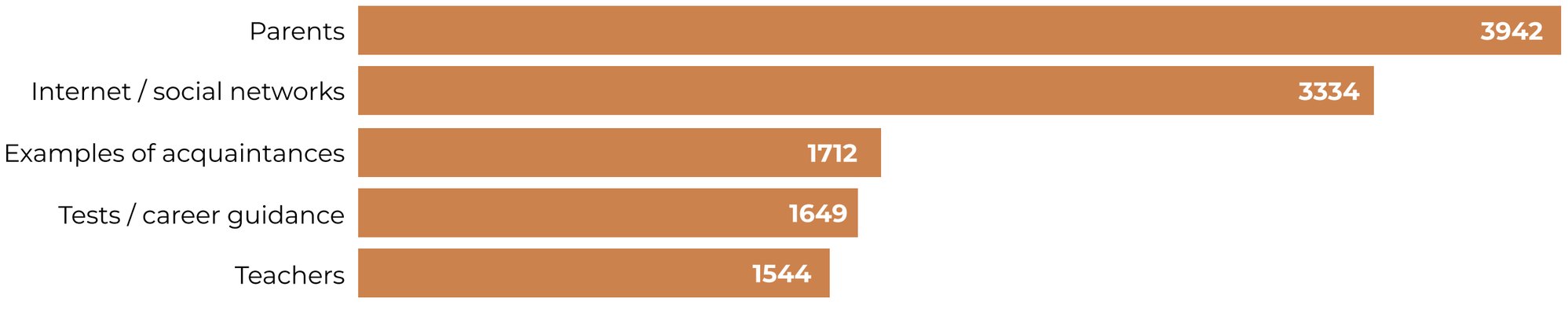


To follow up on this question and to better understand the level of self-determination of students regarding their future profession, an additional question was asked about the degree of confidence in their decision.

It can be seen that respondents who are very confident and fairly confident in their decision make up a significant proportion of the total. However, the proportion of those who are moderately and less confident remains significant - over 40%.

The results of the two previous questions emphasize the need for active support in the process of students' professional self-determination.

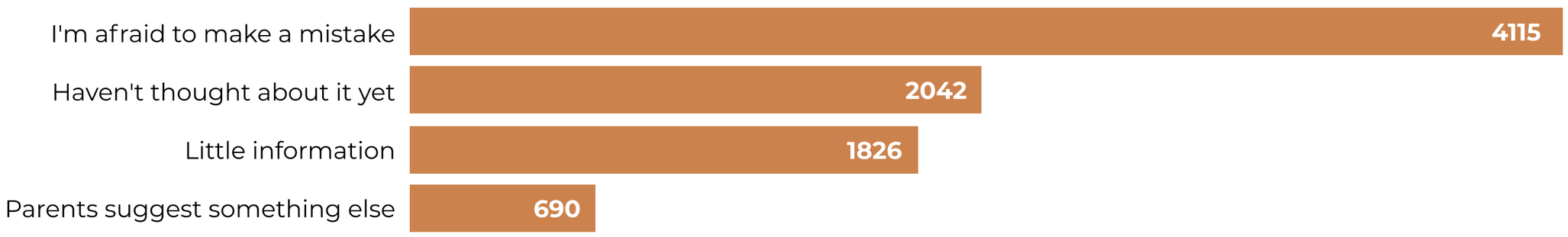
Factors influencing the choice of future profession



The results on this question show that for a large number of students, parents are the main source of influence on their career choice. Next in importance are the internet and social networks, which provide access to information about various professions. Teachers turned out to be the least significant source of information, which may indicate insufficient involvement of teachers in the process of students' professional self-determination.

These data underscore the importance of a comprehensive approach to career guidance, including both family involvement and the use of modern digital resources to broaden students' understanding of career paths.

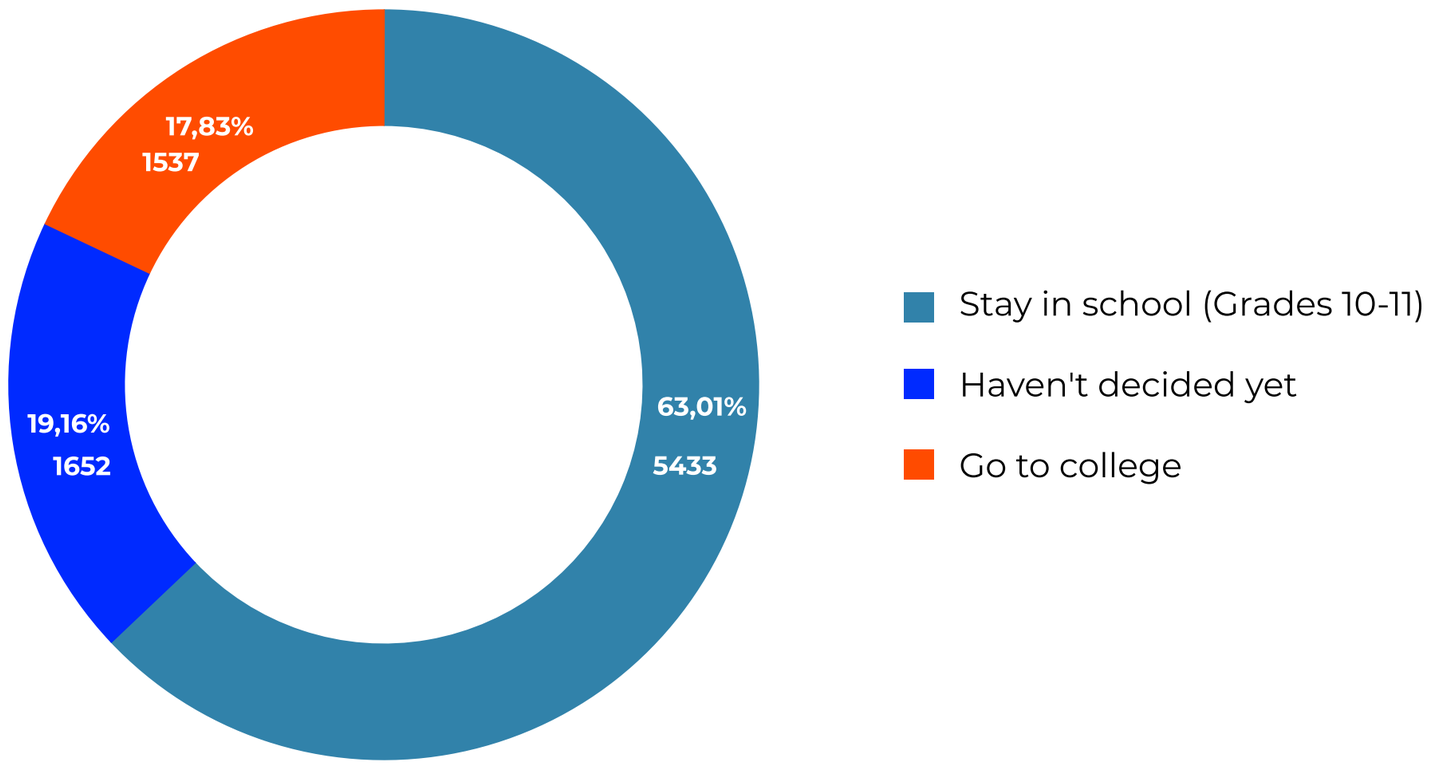
Barriers to choosing a future profession



The main obstacle for students is the fear of making a mistake — this option is mentioned much more often than the others. In second place is the lack of a conscious approach to choice. Lack of information was the third most important factor.

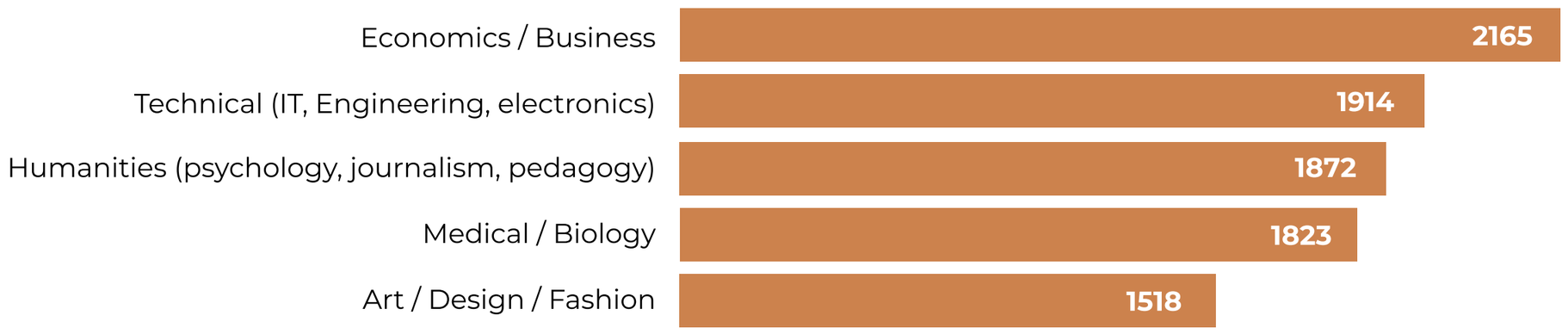
Comparing this data with the previous question, where parents and the internet were the main sources of information, reveals an interesting trend: despite the high influence of parents, some students feel pressure or a mismatch with their family's expectations, which can interfere with their own decision-making. The general conclusion is that in order to increase students' confidence in their career choices, it is important to combine reliable information support with psychological preparation to reduce the fear of making the wrong choice.

Distribution of respondents by future plans



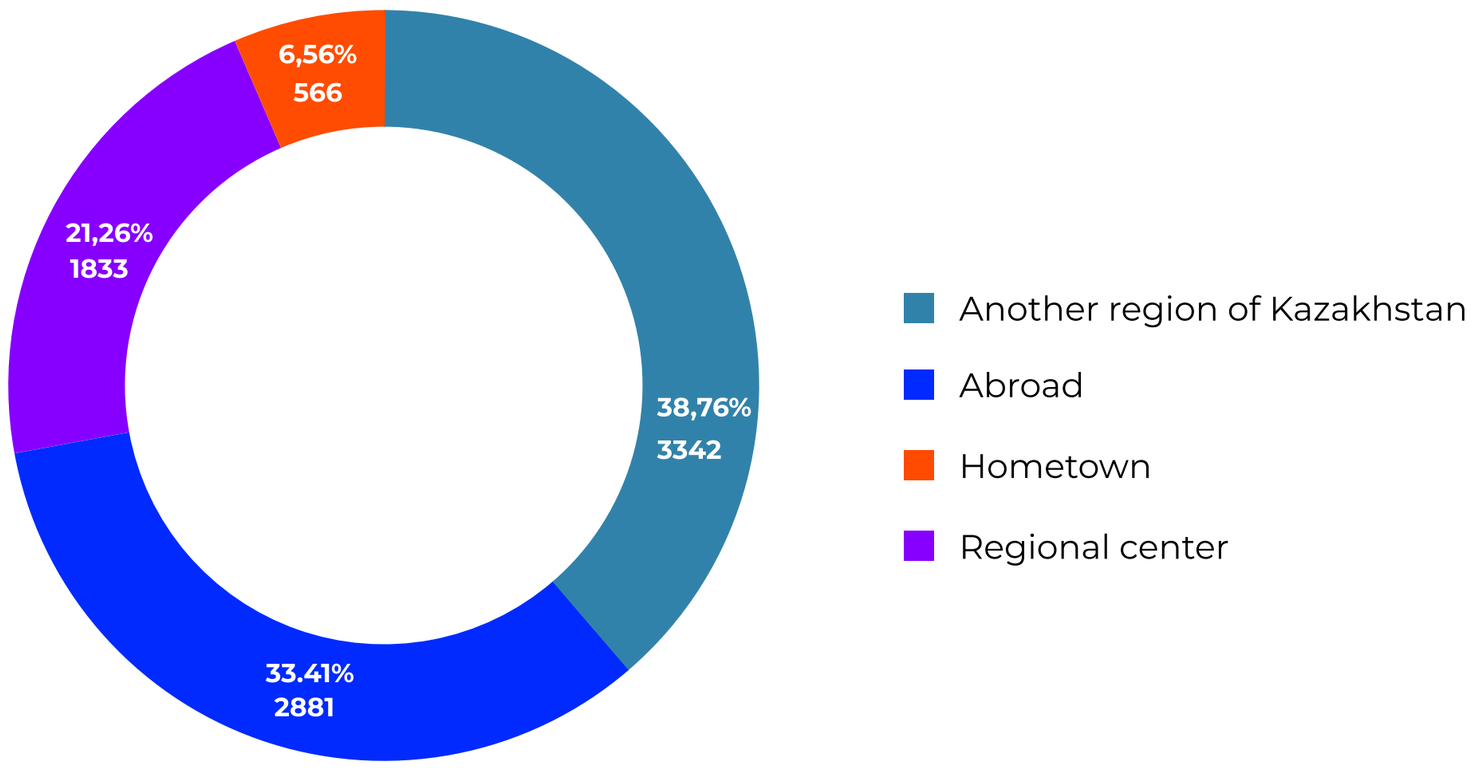
A significant proportion of students (over 60%) plan to continue their education at school. Less than 20% of respondents plan to go to college, and almost 20% of respondents do not have a clear decision.

Areas of further study



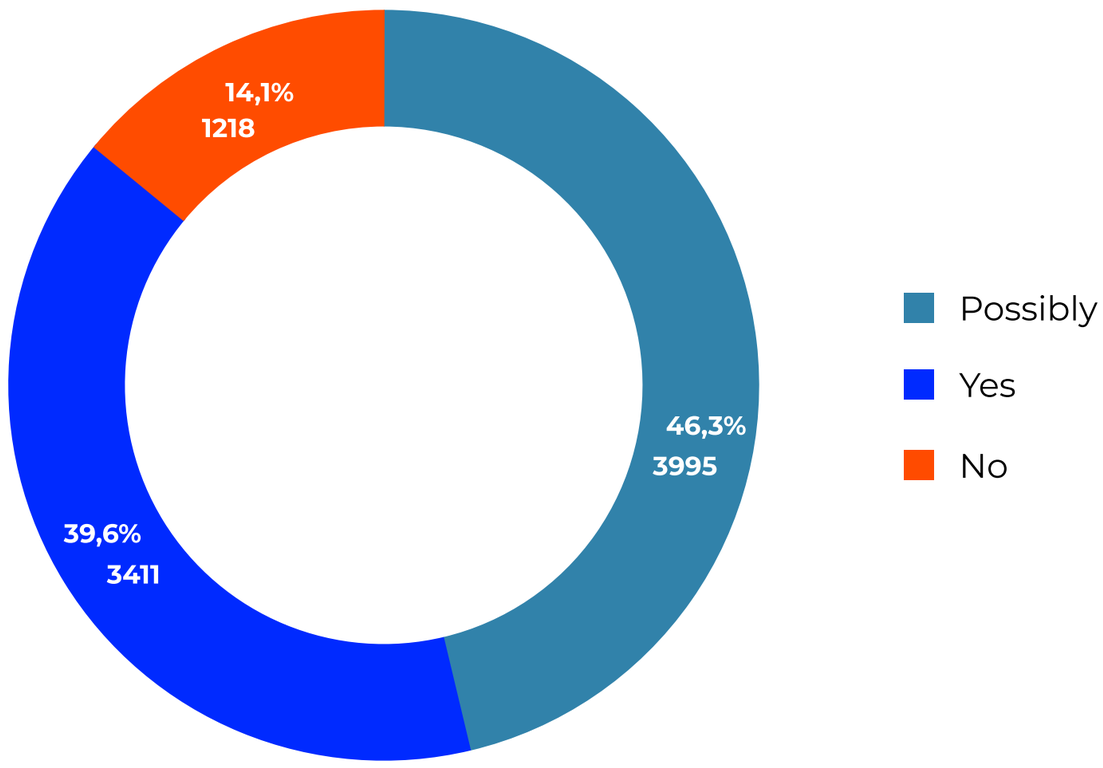
Economics and business ranked first in terms of the number of mentions among the areas of interest for further study. Art/design/fashion received the fewest mentions.

Distribution of respondents by planned location of study



According to the results of this question, most respondents plan to continue their education in another region of Kazakhstan (38%) or abroad (33%). Only 21% of students intend to study in their hometown, and 6.5% in a regional center

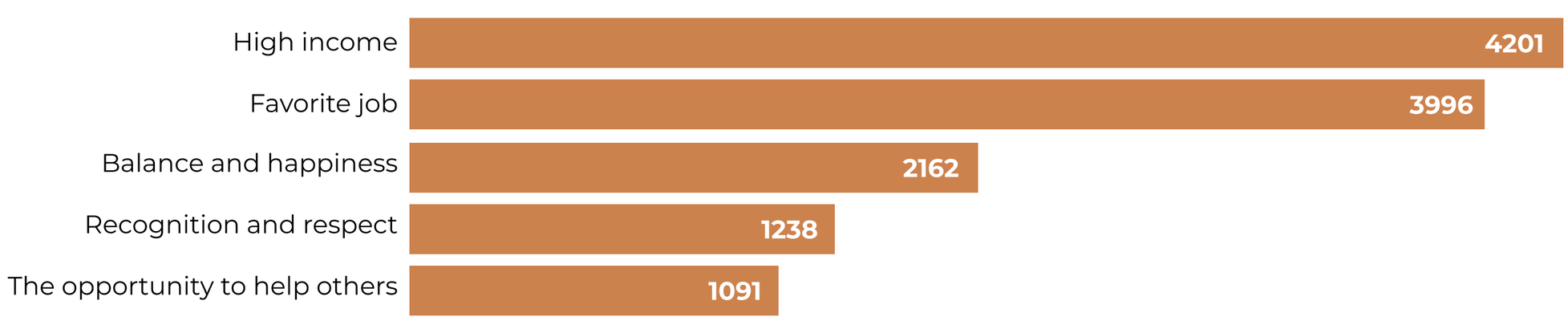
Distribution of respondents by willingness to relocate



14% of students are not ready to move for the sake of education, while almost 40% express their readiness. A significant proportion of respondents are undecided on this issue.

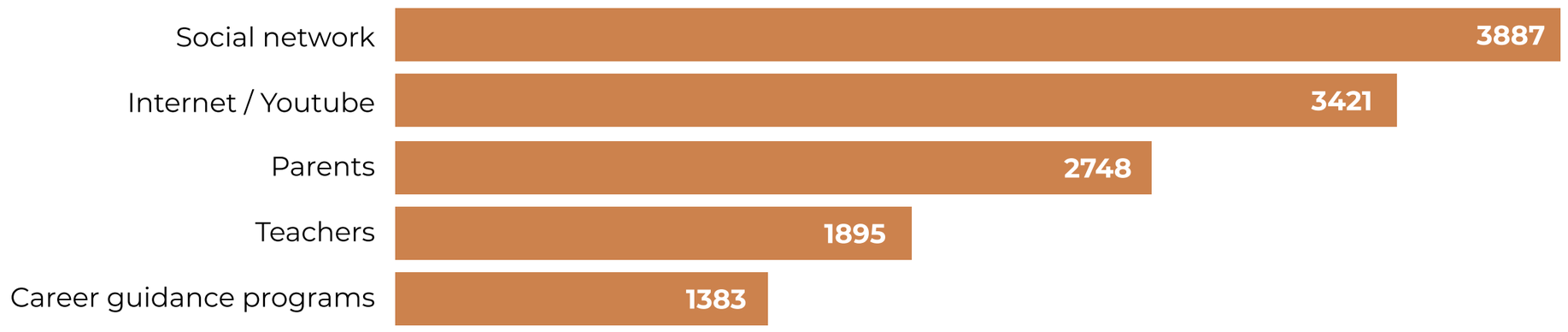
These results give an idea of the geographical preferences of schoolchildren in the region and indicate the high mobility of young people in their search for educational opportunities. In order to make more informed choices and support local potential, it is recommended to conduct career guidance events and provide information about educational and career opportunities both in the region and in the country as a whole.

Criteria for determining career success



Students have different views on the criteria for professional success. High income ranked first in terms of the number of mentions, with 4,201 respondents choosing this option. Almost as many students (3,996) consider it important to do what they love, which indicates a desire to combine financial well-being with personal satisfaction.

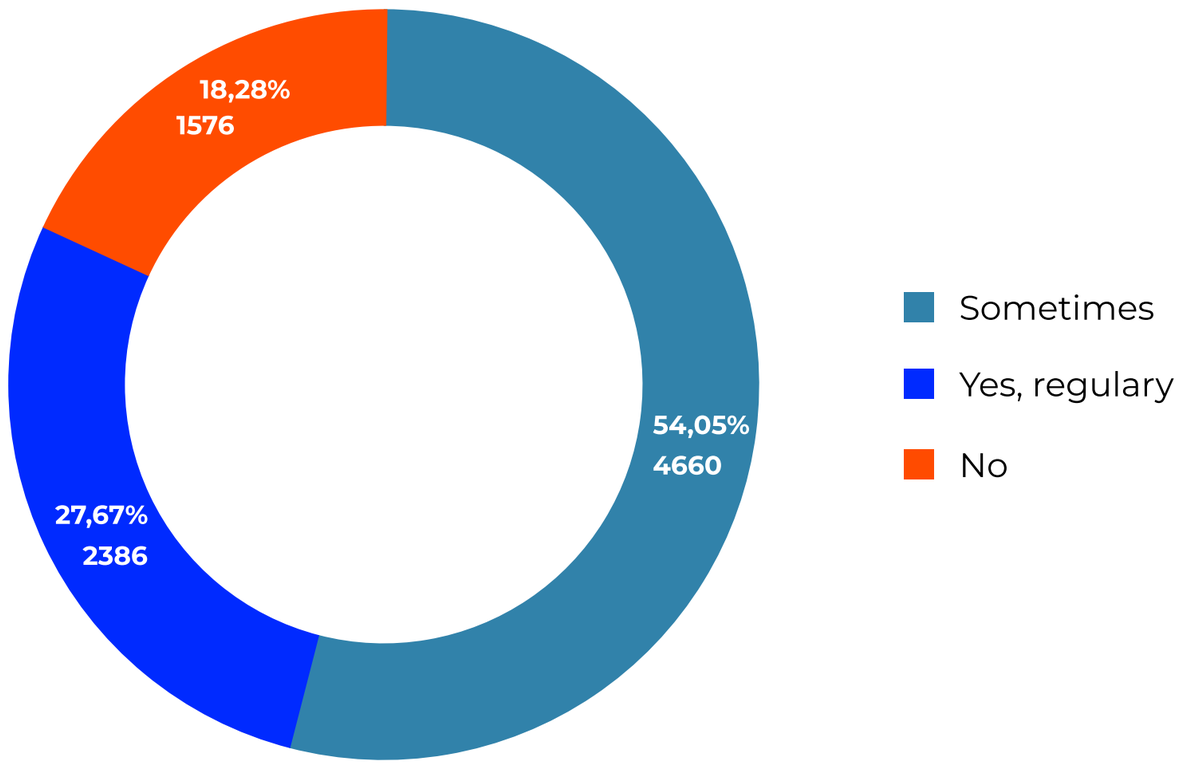
Sources of information about future professions



The main sources of information for students are social networks and the Internet. Next are parents and teachers, while tests and career guidance events were the least used sources of information.

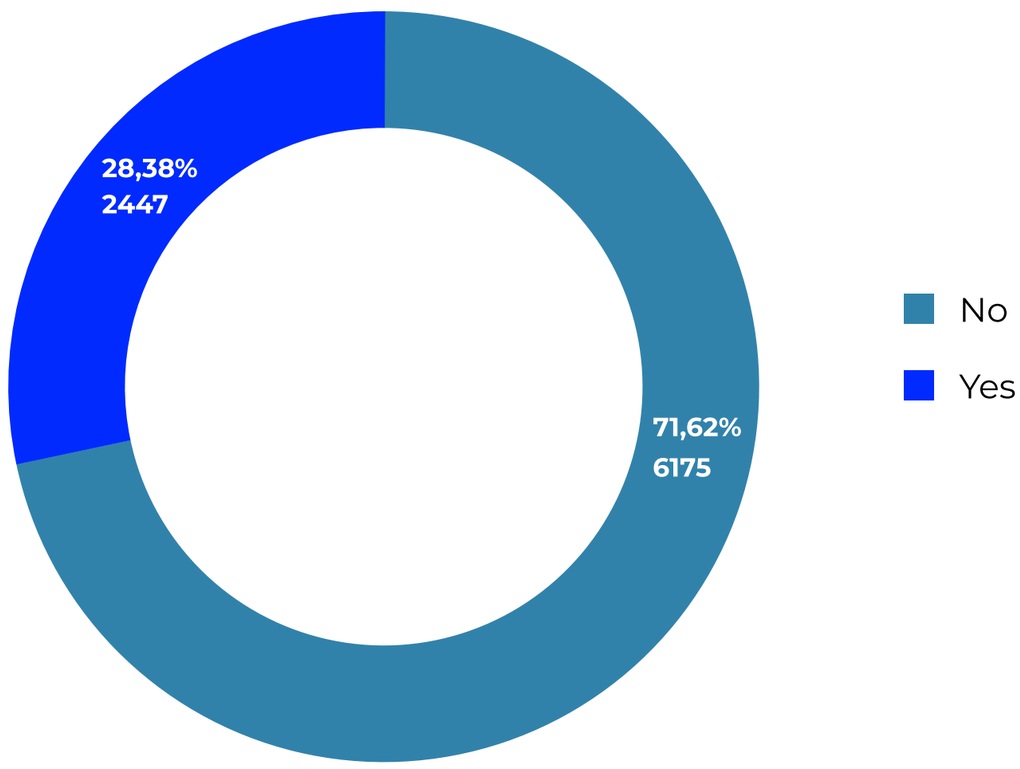
Comparing these data with other research results indicates the significant role of digital resources and family in the process of professional self-determination.

Distribution of respondents by experience of participation in events



Most students have experience participating in academic competitions, contests, and projects, but not on a regular basis. Nearly one-third of respondents participate in such events on a regular basis.

Distribution of respondents by experience of taking tests

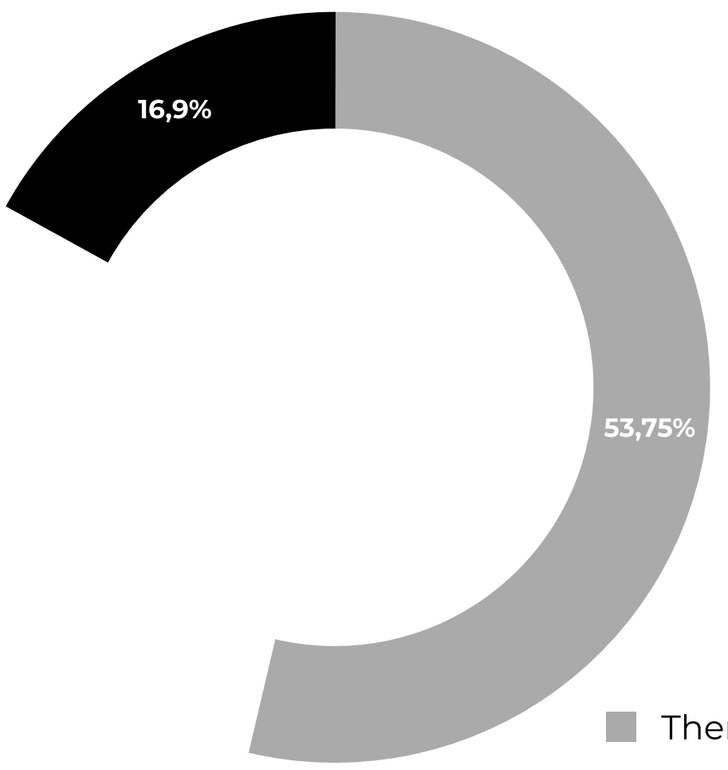


More than 70% of students have not previously taken career guidance tests, which once again confirms the low level of awareness and involvement of students in career guidance activities.

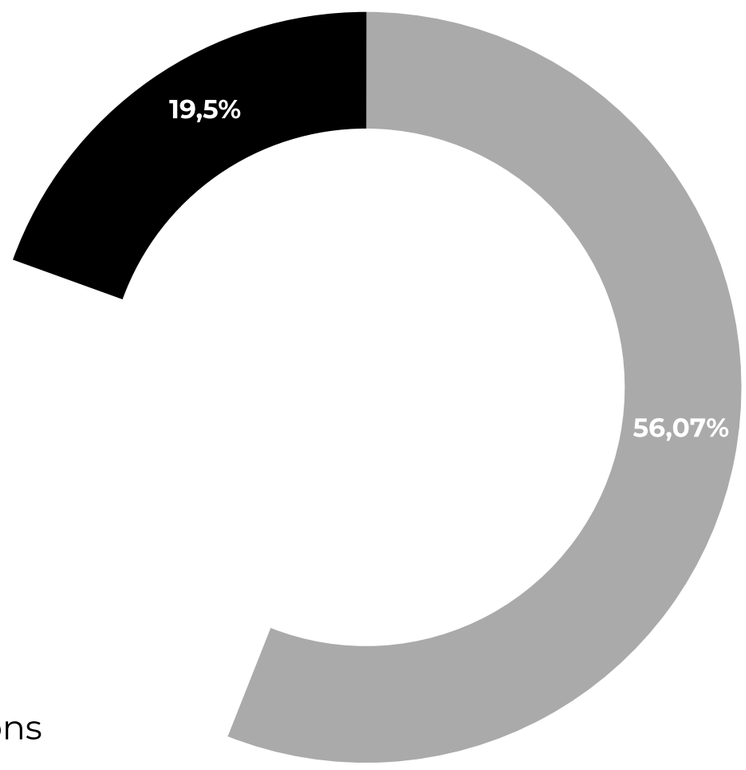
At the same time, the low level of activity in the use of tests and career guidance events highlights the need to increase their accessibility and attractiveness to students.

Distribution of respondents by decision on future profession among those who have and have not taken career guidance testing before

who have passed career guidance tests before



who have not passed career guidance tests before



There are several options

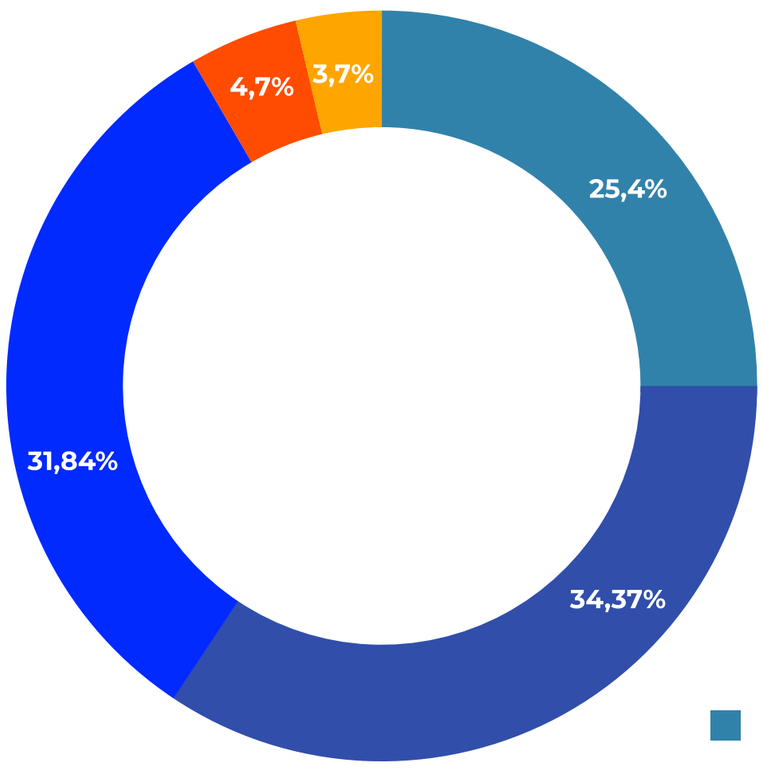
Yes, I know for sure

Don't know yet

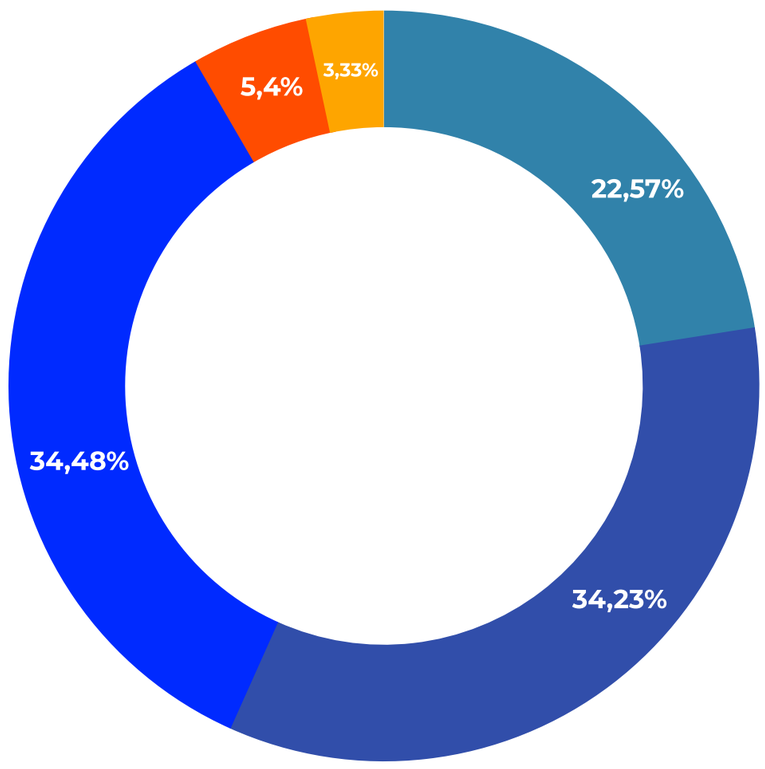
Overall, the distribution structure of the two groups of respondents is similar, but it is clear that among those who have previously taken the test, almost 30% know exactly what they want to become, compared to less than 25% in the group that has not taken the test. In addition, the proportion of those who do not yet know what they want to become is lower among those who have taken the test (almost 17%) than among those who have not (almost 20%).

Distribution of respondents by degree of confidence in their career choice among those who have and have not previously taken career guidance testing

who have passed career guidance tests before



who have not passed career guidance tests before



5 - Very confident
4 - Fairly confident
3 - Medium confident
2 - A little sure
1 - Not sure at all

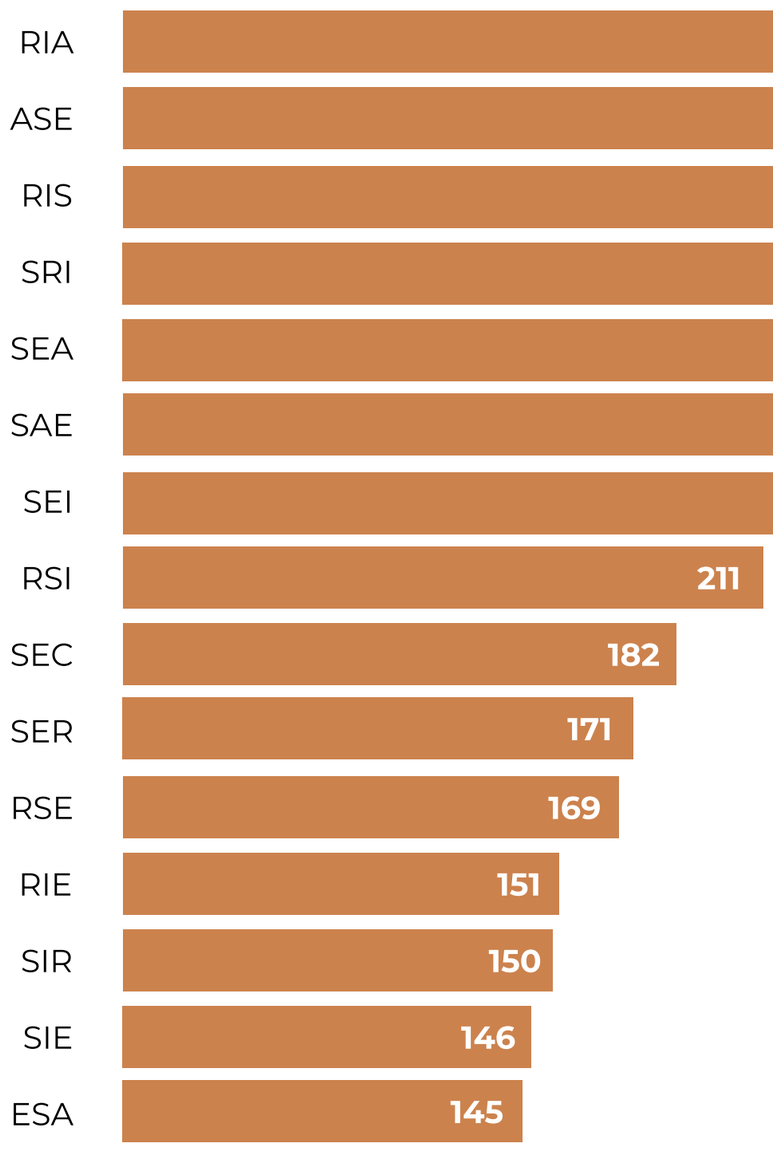
As in the previous intersection, here also we can see that, in general, the distribution structure in the two groups of respondents is similar, but among those who took the test, those who are very confident in their choice account for more than 25%, while in the group that did not take the test, they account for less than 23%.

Recommendation:

- actively integrate modern digital resources and online platforms, such as ProfWise, into the career guidance process;
- raise students' awareness of available tests and career guidance tools;
- involve teachers and parents in jointly supporting schoolchildren in making informed choices about their future careers, combining personal guidance with modern technologies.

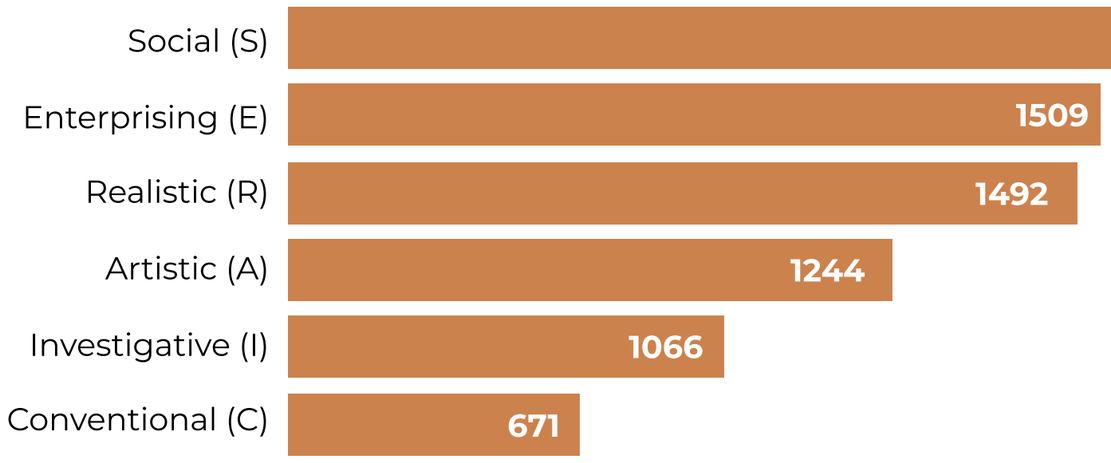
One of the results of the testing was the determination of the Holland code for the student. The code consists of three letters denoting the personality types that are most pronounced in the respondent (the letters are listed in descending order of points for each type). Based on the test results, 155 unique codes were identified. The next Figure shows the 15 most popular codes:

The most popular Holland codes



Due to the considerable diversity, it is difficult to identify the codes that can be called dominant, since even those at the top of the list account for insignificant shares of the total volume. For example, the most popular code is RIA, which accounts for 6.85% of the total volume. The next five codes account for just over 3%, and the rest account for less than 3%.

Dominant personality types



Based on the results of the surveys completed by the respondents, the dominant personality types for each of them were identified. The Social personality type received the maximum number of mentions as dominant (scoring the highest number of points among the six types for the respondent).

Next there were the Entrepreneurial and Realistic types, with approximately the same number of mentions as dominant.

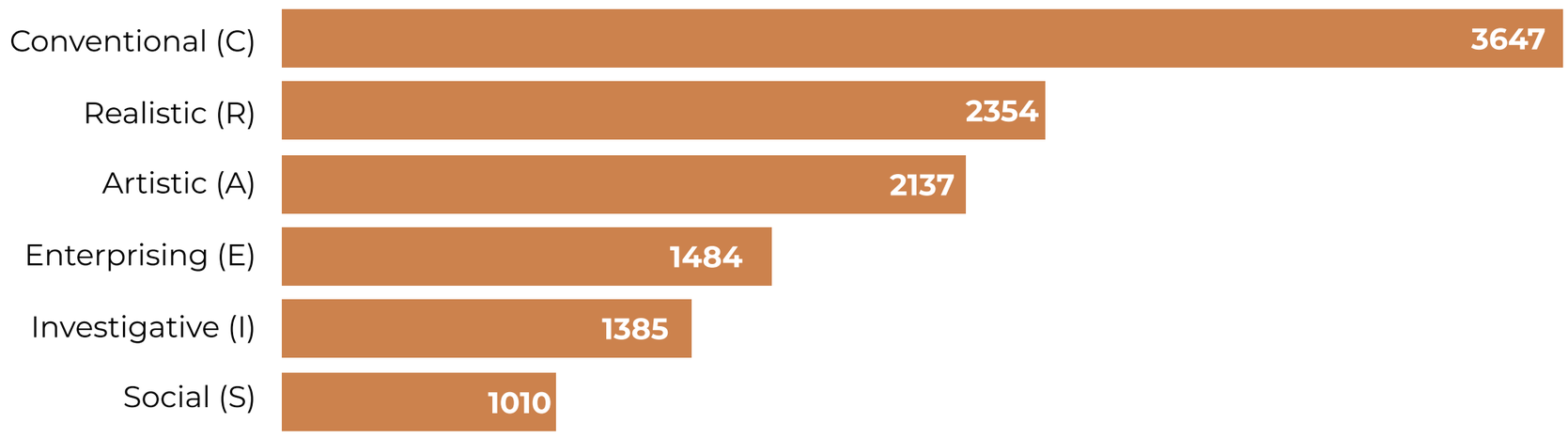
The smallest number of students had a conventional personality type.

The predominance of the social type shows that students are generally oriented towards interaction with people, helping and cooperation. Career guidance programs can emphasize these qualities by demonstrating opportunities in education, healthcare, social and humanitarian fields.

The balanced representation of entrepreneurial and realistic types indicates the need to provide information and experience in both practical professions (engineering, technology) and fields requiring managerial and organizational skills.

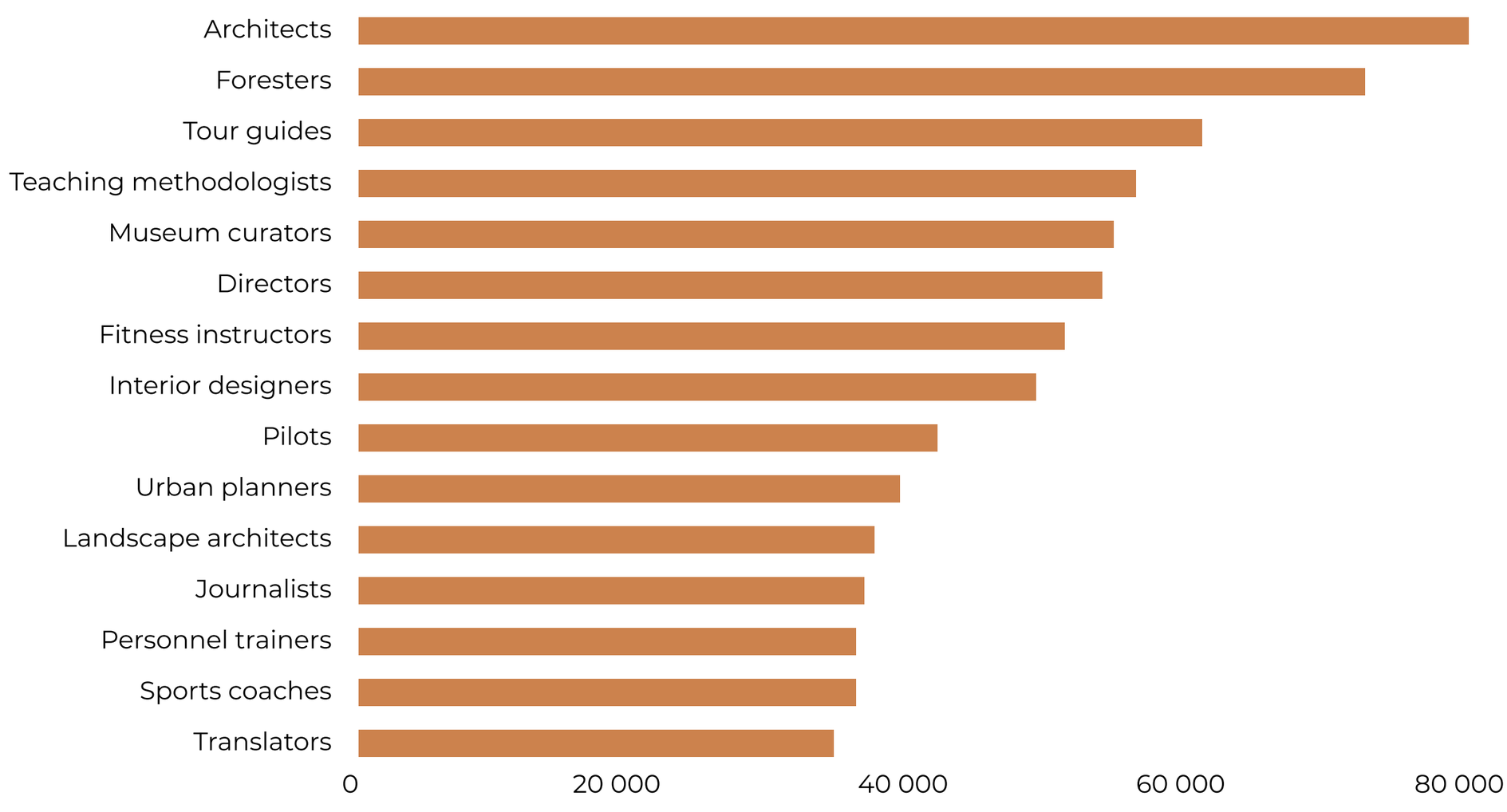
The low representation of the conventional type may mean that traditional office and administrative careers are less attractive to students, which should be taken into account when providing information about career opportunities in these fields.

Personality types with lower scores



In addition, the personality types that received the lowest scores from respondents were also analyzed. Most often, this was the Conventional type. The order of distribution of personality types with the lowest scores once again confirms the accuracy of the distribution of dominant personality types.

Rating of recommended professions



Based on the test results, students are offered 20 recommended professions based on their personality type. The profession that most closely matches the respondent's personality type is shown in first place out of 20, with the popularity of the profession being a key factor - popular professions have the highest priority for reaching first place in the recommendations.

Recommendations based on the results of career diagnostics

1. Consider the critical gap: only 20% of ninth graders choose colleges. The results of the assessment show that less than 20% of students plan to attend college, despite the fact that blue-collar and technical professions are key to the region's economy (industry, construction, agriculture, engineering, oil and gas services).

Recommendations:

1. Develop a regional program to promote blue-collar professions in the West Kazakhstan Region, focusing on oil and gas, construction, engineering, and service professions. Formats include promotional campaigns, career guidance lessons, excursions, videos, and participation by enterprises.

2. Introduce a compulsory module called "Professions in My Region" in schools.

With specific examples: "instrumentation and control engineer," "welding technician," "oil and gas plant operator," "electrician," "agricultural technician," "equipment maintenance technician" — with income, career paths, and demand.

3. Build a "vertical" career guidance system linking schools, colleges, and businesses. Colleges should become centers for presenting professions and places where schoolchildren can gain real practical skills even before they enroll.

4. Conduct professional internships for schoolchildren (5–7 days) at enterprises.

2. Raise awareness: 40% of students are unsure about their career choice.
According to the report:

- only a quarter of students know exactly what they want to become;
- more than 40% feel uncertain;
- 20% have no idea what they want to be.

Recommendations:

- Launch a cycle of systematic career guidance practices in schools: not one-off events, but regular work once a month.
- Introduce a "Steps to Conscious Career Choice" selection chart — an algorithm consisting of 5–7 steps.
- Train school career counselors to work with RIASEC results so that each student receives individual counseling.

3. Low role of teachers in career guidance: pedagogical competence needs to be strengthened. The report shows that teachers are the least significant source of information about professions (after parents and social networks). The reason: lack of tools, time, and special skills.

Recommendations:

- Improve the qualifications of class teachers/career guidance counselors: micro-qualification "Career Guidance for Schools."
- Include career guidance in the official functions of the school (as a criterion of effectiveness).
- Create a bank of lessons and materials adapted to the West Kazakhstan Region.

4. Overemphasis on "popular" humanities subjects. Schoolchildren are most often interested in:

- economics and business,
- humanities,
- social and creative fields.

Physics, chemistry, and STEM are at the bottom of the list of interests and favorite school subjects. The region needs technical personnel, but schoolchildren predominantly choose humanities tracks.

Recommendations:

- STEM camps, engineering workshops, mini-laboratories in schools.
- Internships at STEM companies — "1 Day as an Engineer"
- Educational projects with industrial enterprises.

5. Parents are the main source of influence, which means we need to work with families. At the same time:

- not all parents are familiar with the real labor market;
- parents often steer their children toward white-collar jobs rather than blue-collar professions.

Recommendation:

- Introduce "Parent Universities" — three meetings per year on the topic of professions and the labor market.
- Newsletters and brochures in parent chat rooms ("Professions in the West Kazakhstan Region," "How to Help Your Child Choose a Career Path").
- Involve parents in career excursions.

6. High migration motivation (33% want to study abroad, 38% in other regions).
Only 21% of schoolchildren are willing to study in their own city. This is the most serious strategic risk for the region:

- brain drain,
- a decline in human capital,
- a decline in the potential of local colleges and universities.

Recommendations:

- Create educational products that prevent brain drain—colleges and universities with strong applied programs.
- Develop applied bachelor's degree programs that are in demand in the region.
- Launch the project "Stay in the region — build your career here."

7. Social and entrepreneurial personality types — dominant
Dominant:

- Social (S)
- Entrepreneurial (E)
- Realistic (R)

The weakest type — Conventional (C).

Recommendations:

- Schoolchildren want to work with people, communicate, and demonstrate leadership.
- There is virtually no interest in office work, paperwork, or structured work.
- It is necessary to develop students' interest in engineering and technology.

8. Most schoolchildren lack information about professions.
70% of students have never taken part in a career guidance tests before.
Information about professions is fragmentary.
This leads to fear of making mistakes (the main barrier) and low self-determination.

Recommendations:

- All schools in the region should conduct initial career diagnostics (in grades 7, 8, and 9).
- Open a regional center for career guidance and counseling in West Kazakhstan.
- Create career trial rooms in colleges – VR, tools, workshops where children can "try out a profession."

CONCLUSION

CONCLUSION

The Atlas of New Professions and Competencies in West Kazakhstan Region is a tool that helps to understand how the labor market will change in the next 5–10 years. It shows which areas are developing the fastest, which professions are emerging, which are transforming, and which are gradually disappearing.

The Atlas contains forecasts, descriptions of key trends, and data on which skills will be in particular demand. These include digital literacy, environmental awareness, the ability to work with technology, create new things, and adapt quickly to change. These skills will form the basis for a successful professional career in the future.

The document helps to build a link between the education system and the region's economy: it shows in which areas there is already a demand for new competencies and which training programs should be updated or developed. This makes it possible to prepare in advance for changes in the labor market, shape modern educational directions, and understand which specialists will be particularly needed.

The Atlas also emphasizes the importance of cooperation between schools, universities, employers, and government agencies. Working together helps develop the region's human capital, support the economy, and create conditions for sustainable growth.

Using the Atlas in educational, analytical, and planning activities contributes to the formation of a flexible and modern training system capable of responding to the challenges of the future and maintaining the region's competitiveness in a changing world.

WEST KAZAKHSTAN REGION ATLAS OF NEW PROFESSIONS AND COMPETENCIES