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JOINT REPORT – OVERVIEW

Detailed situation and knowledge needs analysis

elaborated in the frame of the project

"Development of Higher Education Content Aimed to Support Industries for Sustainable Production of Qualitative Agri-food (AgroDev)"

No. 619039-EPP-1-2020-1-LV-EPPKA2-CBHE-JP, financed by the EU Erasmus+ Programme

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INTRODUCTION

The analysis (D1.1) was prepared with the aim to identify preconditions and challenges, which shall be considered during the elaboration of the new study modules for agriculture related curricula in four Central Asia universities- two in Kyrgyzstan and two- in Uzbekistan. The analysis helps partners to understand the needed resources, knowledge, and competence, as well as external factors, which must be considered during the elaboration of the new content, aimed to enhance knowledge and skills of graduates of the modernised bachelor level curricula.

Building on the preliminary needs' assessment during the project development phase the project team have carried out deeper analysis to identify all preconditions and challenges and to choose the most appropriate thematic and approach.

The report provides key information about the study programmes offered in the CA HEIs: detailed revision of the pre-selected bachelor level education programmes: content and structure of the overall programme, content of the thematic related to the project area, balance between subjects, sufficiency (in credits) and quality of the thematic, relevance to and reference to the latest internationally published scientific knowledge, methods used for provision of studies, knowledge scope of the involved academic staff (research experience, publications, capacity building measures, literature used for teaching, pedagogic methods applied), quality assessment approaches, methodologies and criteria used (if any), etc.

Furthermore, the current overview contains outcomes of a survey on the needs of the agribusinesses sector, conducted by the CA HEIs among agricultural and farmers' companies: knowledge and skills gaps identified by farm enterprises; agro-food production and pre-processing practices applied (how companies choose technologies, do they and how introduce new methods, digital solutions, what are their knowledge sources and scope) etc.; national (KG, UZ) regulations and mechanisms stating requirements for agro-food production and pre-processing; new regulations arising at the result of adoption of new CA strategy, aimed to tackle in CA environmental challenges, such as sustainable use of natural resources, environmental degradation. All data included in the report was provided by respective Central Asia universities and Hilfswerk International.

The joint report comprehends conclusions and recommendations from all involved CA and EU partners, to improve higher education content and ensure novel knowledge and practices aiming to support agro-food production industry to apply and manage good agriculture practices (further also named- GAP), digital solutions and sustainable agro-business management principles.

Modernised higher education content is necessary for the development of national agro-food production systems, in which farm-enterprises will apply internationally recognised good agricultural practices and agro-business sustainable management principles and approaches, thus increasing agro-industry (primary production and pre-processing) effectiveness and competitiveness. This will support business development, ensure qualitative food, and clean environment to inhabitants, and indirectly promote regional and rural development.

The analysis was elaborated by the consortium of partners within **the project "Development of Higher Education Content Aimed to Support Industries for Sustainable Production of Qualitative Agri-food" (AgroDev), No. 619039-EPP-1-2020-1-LV-EPPKA2-CBHE-JP, financed by the EU Erasmus+ Programme**.

Two Uzbek universities and two Kyrgyz universities- partners of the project- will be the main beneficiaries of the project and will use the created results during the project and after its completion.

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CONTENTS

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ABBREVIATIONS USED

Abbreviation	Explanation/full title
AAI	Andijan Institute of Agriculture and technologies
APT	Agricultural Products Technologies
BAT	Base of assessment tools
BCC	Bachelor and Master Core Curricula
CA	Central Asia
CGT	Calculations-graphic tasks
CSM	Centre for Standardization and Metrology
EPD	Editorial and publishing department
EU	European Union
FAO	The Food and Agricultural Organization of the United Nations
GAP	Good agriculture practices
GC	General scientific competences
GDP	Gross domestic product
HEIs	Higher education institutions
HPE	Higher Professional Education
IC	Instrumental competencies
KG	Kyrgyzstan
KNAU	Kyrgyz National Agrarian University named after K.I. Scryabin
KRIofLP	Kyrgyz Research Institute of Livestock and Pastures
KRIV	Kyrgyz Research Institute of Veterinary Medicine
MAFIiM	Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic
MAFILR	The Ministry of Agriculture, Food Industry and Land Reclamation
MAFILR	The Ministry of Agriculture, Food Industry and Land Reclamation
MEP	Basic Education Program
NSC	National Statistical Committee of the Kyrgyz Republic
NSU	Naryn State University named after S. Naamatov
OECD	The Organisation for Economic Co-operation and Development
OKO	Department of Education Quality
PC	Professional competencies
RCVDE	Republican Centre for Veterinary Diagnostics and Expertise
RSAS	Republican Soil and Agrochemical Station
SAC	State Attestation Commission
SAEPF	State Agency on Environmental Protection and Forestry
SES HPE	The State Educational Standards of Higher Professional Education
SLC	Socio-personal and general cultural competencies
TSAU	Tashkent State Agrarian University incl. its branches in Samarkand, Nukus and Termez
UZ	Uzbekistan

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1. THE SCOPE OF THE ANALYSIS

1.1. GOOD AGRICULTURAL PRACTICE

The Food and Agricultural Organization of the United Nations (FAO) describes good agricultural practice as a collection of principles to be applied to on-farm production and post-production processes. Good Agricultural Practices focus on ensuring the quality and safety of environment, product, and employees in agricultural production. GAP is a set of the best production recommendations promoting sustainable production, which is constantly evolving. There is no universal GAP handbook for all areas of agricultural production, but there are common goals. The goals of GAP implementation are multidimensional and can be divided into short-term and long-term ones.

The short-term goals are to increase the competitiveness of farms, which, after the implementation of GAP principles, will be able to provide consumers with safe products of good quality. The long-term goals are to save natural resources and environment for future generations.

The elements of the GAP policy are characterized by synergism and the elimination of one element does not allow the implementation of others, e.g., how can safe food be produced in a contaminated environment? To present the scope of GAP activities in detail, the main GAP areas will be defined:

1) Environmental protection is the basic element of agricultural production management on a farm, it includes a) water protection, b) soil protection; c) air protection; d) landscape protection and biodiversity conservation.

To ensure environmental safety on farms, risk-generating factors are distinguished in relation to environmental aspects. In the field of agricultural production, the main element causing pollution of ecosystems are agrochemicals: plant protection products, fertilizers (synthetic and organic like manure), and indirectly the emission of exhaust gases from fuels used during the production process. The goal of GAP is to reduce pollution by selecting appropriate production practices, implementing alternative production methods, and fully controlling the production process in the field and after harvest. The protection of natural resources, landscape and biodiversity takes place through the implementation of the principles of integrated production, which allow to reduce the amount of means of production used while maintaining the production potential at a satisfactory level, as well as by adapting production practices to the environmental condition where production is planned, e.g., crop rotation and cultivation methods in areas with problem of erosion. The result of the reduction of pollutant emissions and the use of production techniques adapted to environmental conditions will be the protection of biodiversity, the greatest challenge nowadays is the protection of pollinators (bees) by, for example, limiting the use of pesticides and the appropriate selection of active substances.

2) Ensuring the quality and safety of the product is a task carried out by fulfilling the previous task, i.e., creating a "healthy and safe" agroecosystem and obtaining safe crops in a good quality within it. In the context of the development of agriculture and export of agricultural products in each region, the implementation of the GAP rules allows for obtaining a product that meets the criteria of international markets.

3) Providing safe and comfortable working conditions is another task included in the GAP. The basic element enabling the functioning of the farm are its employees, only professionally trained staff will allow for the implementation of previous tasks. Therefore, the goal of the farm owner is to organize work that ensures safe and good working conditions.

The GAP rules are developed not only for plant production but also for animal production and aquaculture. Animal production is characterized by a high anthropogenic pressure related to the use of water, non-

renewable raw materials, and greenhouse gas emissions. From the point of view of the safety of employees on farms dealing with animal production, an especially important element is the level of occupational health and safety. Risks to workers in livestock farms come from both animal injury and exposure to zoonosis. From an ethical point of view, an important element of good agricultural practice on livestock farms is animal welfare related to minimum required environmental parameters such as temperature, amount of light, space to move, the level of ventilation, and access to feed and clean water. Farmer should face these requirements by implementing the GAP principles. The GAP rules should be closely related to the regional and international legislation on environmental protection (waste management, pesticides use regulation, etc.), product quality, animal welfare as well as social aspects of work. Compliance with the GAP rules on the farm allows for easier implementation of international certification systems for agricultural production and agricultural products, including Global GAP, SAI, Organic Production (IFOAM, EU). The GAP principles are the basis of these systems; therefore, the implementation of GAP principles is a key task enabling the development of agriculture in the region.

1.2. AGRO BUSINESS SUSTAINABLE MANAGEMENT

Sustainable agro business management goes beyond agricultural production both upstream and downstream. It can include areas as diverse as environmental conservation, local production and procurement of inputs and intermediaries, food processing, transport and distribution, brand development and even farm-based tourism. Diversifying economic activities and developing additional pillars of rural livelihoods enhance the economic sustainbility of the individual farm and the rural community. Environmental sustainability means maintaining the natural resource base of rural livelihoods. This involves and refers, for instance, to renewable resources from land, fisheries and aquaculture and their conversion into food, feed, fibre, bio-based products and bio-energy. Embedded in the local culture, traditions and the social fabric of the rural community, social sustainability refers to institutions and management practices in agro business that recognise the well-being of all stakeholders including the farm household, workers, and consumers.

Central Asia

Central Asia is landlocked within the Eurasian continent, which determines its continental climate. Central Asia's natural resources have continued to degrade due to over-emphasis on production rather than efficiency. Since independence, the transition of the agricultural sector from a centrally commanded system to one with market regulation mechanisms has also been painful. Farmers who were formerly employees of the former state collective farms and became private entrepreneurs, in most cases lack knowledge, skills and capital. They encounter difficulties related to insufficiently developed agricultural infrastructure and access to markets. Water resources are used inefficiently due to the unsatisfactory technical condition of irrigation systems, which has led to an increase of land with highly saline soils. In many cases, the land is contaminated with pesticides, which is a consequence of the previous agricultural production system. However, in the past seven years, this negative effect began to decrease due to the lesser use of pesticides compared to previous years. The arid zones in Central Asia are predominantly used as grazing land for cattle and goats.

The Central Asian countries carried out several reforms in the agricultural sector - land reforms and privatization of farms in Uzbekistan and the Kyrgyz Republic aimed at stimulating the development of agriculture. As a result, a new class of farmers was formed with no previous experience in farm management. New farmers have insufficient knowledge of and access to standard methods, as well as knowledge of

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advanced farming techniques, since extension providing services are developing very slowly and there is a shortage of qualified professionals and consultants.

Uzbekistan

Agriculture is one of the leading and largest contributors to the national economy in Uzbekistan. The country's varied topography presents the most favourable regions for the cultivation of various food as well as industrial crops. Nevertheless, there are significant environmental problems in Uzbekistan, with underlying challenges such as increased wind and water erosion, downstream sedimentation and degradation of water quality, loss of biodiversity, and loss of natural habitat. The Government of the Republic of Uzbekistan recognizes the promotion of GAP as promising area for increasing the competitiveness of domestic agricultural products and developing its export potential. The country emphasises technologies that are sustainable and efficient using low/optimal resource levels. This can contribute to efficient use of seeds, water, fertilisers, etc., as well as to cost reduction of production. Uzbekistan has adopted a strategy aimed at developing a sustainable resource management system, introducing quality assurance systems for agricultural products, and expanding access to international markets.

To produce products with high added value, fruit and vegetable clusters are being organized in the country, proposals have been made to organize 86 agricultural clusters. The clusters envisage solving the problems of organizing processing, storage and drying of products. In 2020, 10.4 million tonnes of vegetables were grown in Uzbekistan, as reported Dunya News Agency.

Kyrgyzstan

Agriculture is a key sector of the Kyrgyz economy. It employs about 40 percent of the country's workforce and accounts for about 20 percent of the gross domestic product. Unfortunately, this sector is being modernized slowly and growth rates are insufficient to reduce poverty and ensure food security in rural areas. Mishandling and ineffective practices have led to the degradation of agricultural land. In addition, inadequate water management continues to hamper agricultural production.

Kyrgyzstan focuses on traditional export agricultural products (dairy products, fresh and processed vegetables, fruits and nuts, wool, and animal skins), as well as meat products. Kyrgyzstan concentrates on three main export destinations: the Eurasian Economic Union, Asian countries (China and the Republic of Korea) and the European Union. It should be noted that the small size of the allotments of farms and the low agrotechnical and economic literacy of the new owners do not contribute to the efficiency of production in the industry. The main problem of agriculture today is the lack of resources and knowledge for further development. The natural and climatic conditions of the country are quite favorable for intensive agricultural production. In the country, of the total arable land area of about 1.2 million hectares, more than a million is irrigated land. There are unique pasture resources with an area of more than 10 million hectares.

Kyrgyzstan's agricultural sector has lost much of its former position. Storage and processing of agricultural products remains a big problem.

1.3.TARGETED ECONOMICS' SECTORS

The new content to be developed aims to support agro business sectors: primary production and pre-processing. Specifically **crop and animal production:**

- Growing of non-perennial plants and crops
- Growing of perennial plants and crops
- Plant and crops propagation
- Animal production
- Mixed farming
- Support activities to agriculture and post-harvest crop activities

New content to be developed within the project does not cover thematic of fisheries and aquaculture.

1.4.FIELDS OF SCIENCE ASSOCIATED TO THE TARGETED ECONOMICS' SECTORS

Curricula will be modernised for bachelor level studies. The analysis is done observing classification of fields of sciences according to the OECD Frascati manual: http://www.oecd.org/science/inno/38235147.pdf. Fields of science, significant for the agriculture sector, are listed in the section 1.2. of the Frascati Manual. Those relevant to the thematic are as following (keeping numbering provided in te Frascati Manual):

1.4.1. The main fields of science, being in focus of the project:

- Agriculture (4.1)
  - Agriculture
  - Soil science
  - Horticulture, viticulture
  - Agronomy, plant breeding and plant protection
- Animal and Dairy science (4.2)
  - Animal and dairy science
  - Husbandry
- Veterinary science (4.3)
- Economics and business (5.2)
  - Business and Management

1.4.2. Other fields of science, having some relation to the main fields:

- Other engineering and technologies (2.10)
  - Food and beverages
  - Other engineering and technologies
- Chemical engineering (2.4)
  - Chemical engineering (plants, products)
- Electrical engineering, Electronic engineering, Information engineering (2.2)
  - Robotics and automatic control
  - Automation and control systems
- Biological sciences classified under the Natural sciences (1.6)
  - Microbiology

Engineering and technology:

- Electrical engineering, Electronic engineering, Information engineering (2.2)

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- Robotics and automatic control
- Automation and control systems

- Chemical engineering (2.4)
  - Chemical engineering (plants, products)
- Other engineering and technologies (2.10)
  - Food and beverages
  - Other engineering and technologies

Agricultural sciences:

- Agriculture, Forestry, and Fisheries (4.1)
  - Agriculture
  - Soil science
  - Horticulture, viticulture
  - Agronomy, plant breeding and plant protection *(Agricultural biotechnology to be 4.4)*
- Animal and Dairy science (4.2)
  - Animal and dairy science *(Animal biotechnology to be 4.4)*
  - Husbandry; Pets
- Veterinary science (4.3)
- Agricultural biotechnology (4.4)
  - Agricultural biotechnology and food biotechnology
  - GM technology

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2. DETAILED ANALYSIS – KYRGYZSTAN

This part of the analysis includes:

a) short overview of higher education offers in the relevant fields of science in the country,
b) analysis of the offer of the involved universities, who will take part in the new content development, implementation, piloting, and further provision after the project,
c) analysis of needs of the relevant industries,
d) SWOT analysis for involved HEIs and for agro business,
e) conclusions and recommendations.

2.1. OVERVIEW OF AGRICULTURE AND AGRO BUSINESS MANAGEMENT RELATED HIGHER EDUCATION OFFER IN THE COUNTRY

Agriculture is of great importance for the Kyrgyz Republic, serving as a source of livelihood for most of the the country's population. Its share in the structure of the total gross domestic product (GDP) of the republic is 15%, while providing 30% of jobs for the economically active population. In the Kyrgyz Republic, training in the field of agriculture is the main priority for universities based on bachelor's and master's degrees. Thus, in the Kyrgyz Republic, the following universities are fully or partially trained at the bachelor's and master's degrees in agriculture, animal husbandry and dairy farming, veterinary medicine, and agribusiness management:

- Naryn State University;
- Kyrgyz National Agrarian University named after K.I. Scryabin;
- Kyrgyz Technical University;
- Osh State University;
- Talas State University;
- Kyrgyz-Turkish University "Manas".

The Government of the Kyrgyz Republic, as the labor market changes, approves the list of specialties and areas of higher professional education, which is implemented in higher educational institutions of the Kyrgyz Republic. Specialized universities that have licenses to implement educational programs, considering the needs of production, develop state educational standards for higher professional education in a specific specialty or direction. The State Educational Standards of Higher Professional Education (SES HPE) are approved by the Ministry of Education and Science of the Kyrgyz Republic and are the main regulatory document for the implementation of educational programmes.

With the demand for highly qualified specialists in certain branches of agriculture, higher educational institutions initiate and develop new experimental educational programs, considering the opinions of specialists and experts.

For example, KNAU named after K.I. Skryabin has developed and implemented the following educational programs in cooperation with foreign universities and specialists: Fisheries and aquaculture; Pasture management; Agricultural sciences.

When developing new educational programs, the principles of the Bologna process are applied, global trends (for example: climate change, green economy, food security) and advanced technologies applied in the production of agricultural products are considered. Specialists and scientists, international experts who are directly involved in the problems of a particular industry are involved in the development of new educational programs. Further, the educational program goes through several stages of discussion, approved by the Ministry of Education and Science of the Kyrgyz Republic, and the Academic Council of

the University. After that, the departments develop educational and methodological documentation, the staff is selected, teachers are invited, and the implementation of the program begins.

KNAU named after K.I. Skryabin has experience in working with modern educational platforms (AVN, Zoom, Classroom, Webex, etc.), electronic library and other Internet resources. Practical work of students is carried out in modern laboratories using molecular biological and classical methods. Furthermore, a collection nursery (greenhouse at Hydroponics) and a virtual laboratory for logistics of the agro-industrial complex, as well as applied research and experimental work are carried out at the premises of an experimental research and innovation center.

2.2. HIGHER EDUCATION OFFER AT NARYN STATE UNIVERSITY

2.2.1. Overview of all curricula related to the main addressed fields of science: agriculture, animal and dairy science, veterinary science, business, and management

Type of data	Study years		
	2018/2019	2019/2020	2020/2021
Total number of study programmes **in agriculture science**, inter alias	2	1	1
Master level	*1*	*1*	*1*
Bachelor level	*1*	*1*	*1*
Total number of students in **agriculture science study programmes**, inter alias	17	13	17
Master level	*8*	*3*	*7*
Bachelor level	*9*	*10*	*10*
Total number of study programmes **in business and management science**, inter alias	1	1	1
Master level	*1*	*1*	*1*
Bachelor level	-	-	-
Total number of students in **business and management science study programmes**, inter alias	8	3	7
Master level	*8*	*3*	*7*
Bachelor level	-	-	-
Number of academic staff members having master or doctor degree, inter alias	10	10	10
In agriculture sciences	*3*	*3*	*4*
In animal and dairy sciences	-	-	-
In veterinary sciences	*1*	*1*	*1*
In business sand management sciences	*4*	*4*	*4*
Number of students' international mobilities	2	4	4
Number of academic staff international mobilities	Information is not available		

2.2.2. Internal study and curricula quality assurance systems and mechanisms

1. **DECISION OF THE GOVERNMENT OF THE KYRGYZ REPUBLIC of August 23, 2011, No. 496 on the establishment of a two-tier structure of higher professional education** in the Kyrgyz Republic.

In accordance with the Law of the Kyrgyz Republic "On Education", to integrate higher professional education into the international educational space and increase the efficiency of the use of budgetary funds, the Government of the Kyrgyz Republic decides:

To establish a two-tier structure of higher professional education, with the assignment of academic degrees "bachelor" and "master", except for some specialties in the Kyrgyz Republic from the 2012-2013 academic year.

This document defines:

- Requirements for the implementation of the Bachelor and Master Core Curricula (BCC).
- The structure and scope of the programme.
- Requirements for staff, educational and methodological, material and technical support of bachelor's and master's programmes.

2. State educational standards of higher professional education in areas, basic educational programs, professional standards, National qualifications framework.

3. The accreditation of educational programs is carried out by national and foreign accreditation agencies based on established regulatory documents.

2.2.3 Regulations to be considered during modernizing curricula

Who is measuring/assessing quality?

Naryn State University named after S. Naamatov (NSU) has developed a Quality Policy and defined objectives in QMS STU 3.07-2017. All quality assurance procedures of the educational process are measured according to this document, and the procedure is carried out by the Quality Management Training Department. There is an Accreditation Department under Quality Management. The quality of the services provided is checked, adjusted by the responsible persons of each department, according to:

- QMS- PO 1.02-2017. Quality management system of education at NSU.
- QMS PO 2.03-2018. The order of the organization and implementation of educational activities in educational programs.

Frequency of the assessment?

The periodicity of the assessment is carried out by internal audits of the activities of the university in accordance with the requirements of the State Standard. The evaluation takes place in accordance with a schedule. The schedule is drawn up by the Quality Management Department and the Instructional Division. The evaluation is carried out systematically in different areas:

- Assessment of students: twice a year (at the end of the first semester and at the end of the academic year). Assessment results are used to adjust the educational process.
- Survey of employers to improve the content of the educational program.
- Survey among parents to improve the services provided.
- Survey of managers' opinion to improve management, etc.

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What criteria are applied?

The set of competencies expressing what exactly the student will know, understand, or will be able to do upon completion of the learning process are defined by the educational standard for the corresponding field of study, it can be supplemented by the educational organization, considering the focus (profile) of the educational program.

Types of control and assessment of students in the course of the discipline:

- Current control ensures the assessment of the progress of the students in the disciplines (modules) and practices, it can be carried out in the form of colloquiums, computer-based or paper-based tests, written quizzes, evaluation of students' participation in debates, round tables, business games, solving situational problems, etc.
- The purpose of the final control of a discipline is to determine the extent to which the planned learning outcomes of each discipline (module) and practice have been achieved in each period of study (semester) and usually takes the form of examinations, tests, summarising the results of a point-rating system of assessment.

Types of control for assessing learning outcomes:

- Testing (in theory) is a method of identifying and assessing the level of learning achievements of students, carried out through standardised materials -assessment tools; (in practice) a technological process implemented in the form of algorithmically ordered interaction, the learner with the system of assessment tools and culminating in the evaluation of results. It can be paper-based or computer-based.
- Individual oral interview-colloquium, survey, interview, round table, discussion, polemics, dispute, debates.
- Written work- quizzes, essays, calculations-graphic tasks (CGT), report, project, etc.

For each assessment tool, criteria for the formation of assessments (Quality Management System of Professional Education (4.02-2017- internal code)) must be given in the base of assessment tools (BAT).

The purpose of the knowledge and quality control is to evaluate the student's work for the semester, the degree of assimilation of theoretical knowledge, check the skills of independent work, the ability to synthesise acquired knowledge and to apply it in solving practical, professional problems.

When determining the criterion for giving marks, the volume, depth of knowledge, argumentation, and evidence, as well as the general outlook of the student are considered. The ability to give formulations and definitions of concepts and terms, to draw logical conclusions should be considered as well.

Who evaluates the findings?

The results are assessed by the rectorate, deans of faculties, heads of departments. The results of the questionnaire are discussed at meetings, round tables and decisions are made to improve the activities of the university; adjustments are made to the existing plans.

- *Who is responsible for corrective measures to be applied?*

Head of Educational Department, Deans of Faculties and Heads of Departments are responsible for applying corrective measures in accordance with QMS Regulation 3.19-2019.

- *What are tools to promote quality?*

The following tools are used to promote the quality of education: questionnaire, interviews, Internet polls, round tables, appeals, meetings, seminars.

All these tools are systematically used at NSU to improve teaching and educational activities. Due to the emerging COVID-related situations in the world and the country, NSU worked online for a year. This situation also influenced our activities, at this time we will try to focus on Internet polls. Questionnaires for employers, students, teachers, supervisors, and parents. The content of the questionnaires is updated in accordance with international and national standards.

2.2.4 Collaboration with public sector institutions

Names of main partners and their field/sector of activity	Agricultural sector: animal husbandry, water and land reclamation, irrigation, veterinary science, biotechnology, molecular biology, agricultural engineering, traffic organization and safety, environmental protection and forestry, chemicalization and plant protection, Phytosanitary Control, Soil and Agrochemical Control, State Registration Service, Land Management and Registration of Rights to Immovable Property, Cartography and Geodesy Service, Economic Development, Tax Service, Applied Mathematics and Economic and Mathematical Methods. 1. The Ministry of Agriculture, Food Industry and Land Reclamation (MAFILR) of KR. 2. State Selection and Breeding Center of the Ministry of Agriculture and Food and Agriculture of KR. 3. Kyrgyz Research Institute of Livestock and Pastures (KRIofLP). 4. Department of Pastures and Fisheries of KR. 5. Department of Crop Expertise (MAFILR) of KR. 6. Department of Water Resources and Land Reclamation (MAFILR) of KR. 7. Water Construction Directorate of the Department of Water Management and Land Reclamation. 8. Land Reclamation Hydrogeological Expedition of the Department of Water Management and Land Reclamation. 9. State Inspectorate for Veterinary and Phytosanitary Security (SIVPS) under the KR Government. 10. Republican Centre for Veterinary Diagnostics and Expertise (RCVDE). 11. Kyrgyz Research Institute of Veterinary Medicine (KRIV) named after A. Duisheev. 12. Research Institute of Molecular Biology and Medicine. 13. Institute of Mechanical Engineering of the National Academy of Sciences of the Kyrgyz Republic. 14. State Agency on Environmental Protection and Forestry (SAEPF) of the KR. 15. Republican Soil and Agrochemical Station (RSAS). 16. The Department of Chemicalisation and Plant Protection under the Ministry of Agriculture and Food of the Kyrgyz Republic. 17. Department of Phytosanitary Control. 18. Kyrgyz Research Institute of Farming, Bishkek. 19. Botanical Garden named after E.Z. Gareev of the National Academy of Sciences of the Kyrgyz Republic. 20. Department of Environmental Monitoring and Forestry Management of SAEPF KR.

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	21. Kyrgyz State Natural Park Ala-Archa. 22. Chui-Bishkek environmental protection department, regional environmental protection departments. 23. Environmental Strategy and Policy Department under the SAEPF under the KR Government. 24. Interregional Department of State Inspection for Environmental and Technical Safety, Bishkek. 25. State Registration Service under the Government of the Kyrgyz Republic 26. Department of cadastre and registration of rights to real estate under the State Registration Service under the Government of the Kyrgyz Republic, city and district administrations for land management and registration of rights to real estate. 27. State Cartographic and Geodetic Service of the Kyrgyz Republic. 28. State Design Institute for Land Management- KYRGYZGIPROZEM. 29. Kyrgyz Research Institute of Irrigation, Bishkek. 30. State Fund for Economic Development under the Ministry of Finance of the Kyrgyz Republic. 31. Bishkek Center for Testing, Certification and Metrology at the Center for Certification of the Ministry of Energy of the Kyrgyz Republic. 32. Naryn Oblast State Seed Inspectorate. 33. State Inspection for Veterinary and Phytosanitary Safety under the Government of the Kyrgyz Republic: Naryn District Administration. 34. Ak-Talinsk Rayon Department. 35. Kochkor Rayon Department. 36. Zhumgal Rayon Department. 37. At-Bashin Rayon Department. 38. Naryn Rayon Department of Veterinary and Phytosanitary Security.
Short description of collaboration	The following mechanisms of interaction with public sector institutions are practiced at the National State University: • Monitoring the quality of specialist training. • Joint development of competences and graduate model. • Organisation of excursions and internships for students, teachers and university staff at relevant organisations, creation of conditions for all types of internships. • Participation in the formation and development of topics for term and diploma works, student projects. • Participation as a member of the GEC. • Reviewing final qualifying works. • Practice is conducted in state institutions. Employers annually participate in the SAC (State Attestation Commission) where they have an opportunity to make comments and suggestions for the improvement of the educational programme. In this regard, the main customer and consumer of university graduates is no longer the state, as before, but a multitude of independent business structures (firms, companies, corporations, small enterprises). They increasingly

	determine the content and orientation of professional training, formulating a clear demand for specific competences of a university graduate.
Results, benefits of the collaboration	
Students acquire research skills and professional competences in their fields of study and are introduced to new educational technologies.	
Vision on how this collaboration can be used for the new curricula development and provision	
The interaction of higher education and business structures in the context of modern market relations emphasizes the need for this process and its usefulness from the standpoint of practice-oriented learning and the formation of practical skills of university graduates. Involving teachers in the creation of a corporate training system enriches them with new methodological ideas, delves deeper into real problems and the specifics of various structures. Students involved in specific tasks become active participants in the learning process, gaining teamwork skills and experience in solving corporate problems. Such an approach in training specialists in the specialty "Technology of production and processing of agricultural products", which belongs to the new generation of interdisciplinary specialties, allows really reducing the "eternal" gap between the needs of the labour market and the quality of graduates of a modern university. Business structures require specialists who can immediately apply the acquired knowledge for quality communication activities.	

2.2.5 Collaboration with industries

Names of main partners and their field/sector of activity	Agricultural sector in the field of livestock and crop production: Livestock sector: 1. Agricultural cooperative "Shamshy-Ata" 2. Mini slaughterhouse for cattle "Toyboss" 3. LLC "Adal Azyk" 4. LLC "Kochkor product" 5. LLC "At-bashy sut" 6. Mini workshop Naryn "Asylst" Crop production sector: 1. Naryn Experimental Station at the Institute of Agriculture of the Kyrgyz Republic 2. Naryn regional department of chemicalization and plant protection 3. Naryn PE "Teplitsa"
Short description of collaboration	• Involvement in defining the topics of the bachelor's thesis. • Enhancement of staff qualifications (conducting master classes, lectures, practical classes, round tables, seminars). • Council of employers is established and meets regularly with the faculty and students to improve the quality of education, discusses curricula, subjects, practical and laboratory classes, topics of coursework. • Conducting educational, production, pre-qualification, and educational and experimental practices. • Study tours to enterprises are organized.
Results, benefits of the collaboration	
Through various internships and work placements, students acquire research skills and professional competences in their fields of study and learn about new educational technologies. In addition, students work on their own and acquire special skills in their chosen profession. The topics of final qualification are	

determined during the internship in the third year on the example of a particular enterprise/organisation and are researched from the scientific and practical side by the student before defending the final works, and before this topic is participated in student research paper competitions. Employees of the company can give guest lectures, master classes, and share experiences in practical work, where lecture, practical and laboratory hours are specifically divided up in the curriculum.
Vision on how this collaboration can be used for the new curricula development and provision
Cooperation between the university and partners (organizations, enterprises, firms) can change existing curricula taking into account the new requirements of the market (partners), annual recognition of employers' requirements for graduates, the relevance of the topics taught within the subjects, market needs for adaptation in accordance with the natural and climatic and regional characteristics of the Naryn region, changes in user skills in passing subjects, adjusting the curriculum, developing and providing quality improvements in accordance with the focus of the content, including modern requirements and new competencies for a future specialist.

2.2.6 Detailed information on the curricula to be modernised

2.2.6.1 Curricula and its scope

Data, information required	Information
Title of the study programme	610600 "Technology of production and processing of agricultural products"
Faculty/unit providing the study programme	Faculty of Agriculture and Technology
Credits in national system /credits in ECTS	240
Duration of studies (in years)	4 years (full-time education), years (distance studies)
Degree or qualification to be obtained	Bachelor "Technologies of production and processing of agricultural products"
Knowledge to be obtained	Students receive knowledge in the field of technological developments aimed at solving complex problems of organizing the production and processing of agricultural products.
Skills to be obtained	Skills in managing the technological processes of agricultural production and processing; Assessment of the physiological state, adaptive potential and determination of factors regulating the growth and development of agricultural crops, assessment of types and species of animals according to modern taxonomy, assessment and their role in agriculture and determination of the physiological state of animals by morphological characteristics, appliance of microbiological technologies, assessment of quality of agricultural products considering biochemical indicators and determining the method and its storage and processing, characterizing plant varieties and animal breeds on a genetic basis, diagnosing the most common diseases of farm animals and providing veterinary care.
Competencies to be obtained	A graduate of the bachelor's degree programme 610600 - "Technology of production and processing of agricultural products"

	with the academic degree of "Bachelor" should have the following competences: 1. General scientific competences (GC) 2. Instrumental competencies (IC) 3. Socio-personal and general cultural competencies (SLC) 4. Professional competencies (PC) Upon completion the graduate will be: - enabled to implement technologies for the production of crop and livestock products, - enabled to implement technologies for storage and processing of crop and livestock products, - enabled to implement technologies for storage and processing of fruits and vegetables, - enabled to assess the quality and safety of agricultural raw materials and products of its processing in accordance with the requirements of State Standards, - enabled to analyse and plan technological processes in crop production, livestock production, processing and storage of products as objects of management, - enabled to develop business plans for production and processing of agricultural products, marketing, - enabled to analyse and plan technological processes in crop production, livestock production, processing, and storage as objects of management.
Whether, after completing the bachelor studies, there is a possibility to continue master level studies? Are there research needs and opportunities in the selected field?	After completing their studies, bachelors can continue their studies in master cource in Germany Weihenstephan-Triesdorf, according to an agreement with the Naryn State University, where they can conduct research within the master program, comparing different factors of countries of technology and agricultural processing. Master's degree students, within the framework of the chosen dissertation topic, depending on the region, can conduct research on the technology of production and processing of agricultural products. The Master's programme considers the particularities of technology and processing of agricultural products to climate change and the use of information technology. Bachelor's degree students in Production and Processing Technology of Agricultural Products and Ecology and Environmental Management can undertake practical training abroad in Germany. After the internship, they can enrol in a master's programme and obtain an MBA Diploma in Agrarian Management.
Further activities	Types of professional activities of graduates: a) production and technological, b) organizational and managerial, c) research and development.

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	After completing this course, they can continue their studies at their own university; continue studying at another university; continue education in graduate school- to engage in research work; work in the branches of production technology and processing of agricultural products; work as a manager in all public and private institutions, firms, small businesses, and other institutions. Master's students may work in research institutes, can continue their studies in doctoral (PhD) and postgraduate programmes, including at foreign universities (up to 1%).
Carrier opportunities per sectors	Public sector, private sector, self-employment in own small enterprise, LLC, etc.

2.2.6.2 Structure of curricula to be modernised

Curricula blocks	Mandatory disciplines (in national credit system and in ECTS)	Optional disciplines (in national credit system and in ECTS)
Basic disciplines for the specialization area	Biochemistry/3 Basics of microbiology/2 Basics of animal science/2 Basics of crop production/4 Basics of agricultural research/3	Crop breeding/3 Slaughtering technology/3 Introduction to the profession/2
Professional disciplines	Plant physiology/5 Morphology and Animal physiology/4 Microbiology of food products/3 Biochemistry of farm products/6 Food biochemistry/6 Fundamentals of veterinary medicine and animal breeding techniques/2 Crop production/4 Livestock production/4 Grain storage and processing technology/4 Livestock product storage and processing technology/4 Standardisation and certification of agricultural products/4 Processing equipment/2 Agrochemistry with soil science and farming/3 Organisation of Production and Entrepreneurship in the Agro-industrial Complex/2 Life Safety/3 Food Technology/4	Veterinary and sanitary expertise of agricultural products/4 Food sensory analysis /5 Fundamentals of agricultural logistics /2 Flour and bakery technology/6 Food packaging materials and storage methods/4 Technology of milk and dairy products/6 Meat processing technology/7 Egg processing technology/5 Water supply and water quality control/4 Food and preservatives technology/4 Techno-chemical control of agricultural production and processing /4 Basics of scientific research/3

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Research and practical work	Nutritional physiology/3 Basics of agricultural biotechnology/4 Refrigeration engineering and technology/3 Accounting and financial credit/3 Design and construction of small processing plants/3 Sanitation and hygiene in processing plants/3 Food product processes and apparatus/3 Membrane technology/3 Automated control systems / 2 Management and marketing/3 Food engineering/3 Food Chemistry/3 Food research methods/4 Pre-qualification internship / 4 credits Industrial practice / 4 credits	Ecological analysis in agro-processing and production/3
Practice	Internship/2	
TOTAL	118	65

The curriculum of 610600 "Technology of production and processing of agricultural products" in Naryn State University (NSU) at the Department of Agrarian and Technical Disciplines is based on the State Educational Standard (SES) of Higher Professional Education (HPE). The total workload intensity of mastering OEP HPE for training bachelors is at least 240 credits (credit units).

The workload of the main educational program (HPE) of higher professional education (HPE) in full-time education for an academic year is at least 60 credits (credit units). The workload of one academic semester is equal to 30 credits (credit units) (with two semester structure of the educational process).

One credit (credit unit) is equal to 30 hours of student's academic work (including his classroom work, independent work and all types of certification).

The analysis of the curriculum shows that the student's weekly classroom load is on average 30 hours per week, the sequence of teaching disciplines is observed, the minimum vacation time in the academic year is 10 weeks (at the request of the State Educational Standard of Higher Professional Education- 7-10 weeks)
To ensure transparency of activities the university uses the AVN information base (distance learning program).

The whole information of assessment criteria, module sheets and student ratings are managed in the AVN information system (distance learning software). Each student has a code to enter the database and to receive information about his/her module rating. Before the start of the seminar the student's workload is controlled by the Office of Academic Affairs and the Dean's Office when schedules are prepared. The progress of students is monitored by the AVN system. The timetable is in accordance with the curriculum and the daily class load does not exceed 5 hours.

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Teaching and learning activities	
Activity	**Proportion of typical student workload (%)**
Lectures	Extra-curricular
Reading & self-study	Extra-curricular
Watching Media	26,6
Individual assignments	20
Group assignments	13
Laboratory work	5
Field visits	**Internship at a training and experimentation workshop 8,8**

How many hours per week is a student expected to spend on studying, i.e., on all activities above together?

The student load in one semester is 30 credits. 1 credit is equal to 30 academic hours. In the semester, 900 hours are provided, of which 50% are classroom, i.e., 450 hours. Every day, a student is engaged in 6 hours for 15 weeks (semester duration). The remaining 450 hours the student is engaged outside the classroom.

2.2.6.3 Existing study and research infrastructures (acquired during the last 10 years and fully functional)

Description
Learning facilities, including distance learning possibilities:
At NSU, educational programmes have traditionally been delivered in full-time and remote learning forms. However, due to the pandemic, they have switched to a hybrid system of education, with lectures held online and practical classes held offline. NSU uses distance learning technologies using the AVN system. This system was introduced in 2012 and operates in accordance with the Regulation of the SMS WL 3.25-2017 "On AVN Information System". All necessary information resources are entered into the AVN system, and the student can use them remotely. For some disciplines, electronic educational and methodological complexes have been developed, including lectures, materials for practical work, assignments, tests, textbooks. Furthermore, the NSU library is connected to the kirlibnet.kg system, which makes it possible to search for the necessary literature in the libraries of other universities. The information system AVN (http://avn.nsu.kg) is used as a tool for collecting, monitoring, and following up on information on students' academic achievements. During the academic year, the Dean's Office and the NSU Registrar's Office keep records and monitor the movement of students, their academic progress and attendance. All academic achievements of students are stored on the server of the AVN information system, which is administered by the NSU Registrar Office. NSU Registrar's Office analyzes student progress and issues transcripts. In the dean's office, students' academic achievements are recorded in electronic score journals (gradebook).

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The electronic database of teaching and learning resources currently consists of more than 2,723 items. Based on a cooperation agreement, NSU has access to information sources and the library fund of the Weihenstephan University, with which cooperation has been established to exchange special and scientific literature and information, etc.

Distance learning technologies are successfully used at the university. Students are offered all kinds of forms and types of consultations, final tests (examinations) via the Internet – video conferences. To organize the educational process, 10 computer classes are used, which are equipped with personal computers for conducting training sessions.

Laboratories available for studies:

NSU named after S. Naamatov guarantees the availability of sufficient, accessible, and appropriate material and technical and information resources. NSU uses innovative educational and methodological resources, i. e. an interactive whiteboard, audio and video equipment, and computer programmes. Since 2015, 3 interactive whiteboards have been purchased; QGIS and ArcGIS programmes are used for practical classes.

Experience shows that the use of laboratory facilities and the close interaction between teacher and student is evident in individual assignments and research work. The curriculum of the direction is allocated 50% of the time for independent work. To carry out independent work, the student often contacts the teacher and thus a joint activity is achieved. The results of scientific research of teaching staff are usually introduced into the educational process. In accordance with the Regulation of NSU "Student's first research paper", approved (updated and supplemented in 2017) by the Rector on March 7, 2014, the university holds a competition of students' independent works 2 times in an academic year. The participation in the competition gives the student an incentive to study the discipline in more depth. Employers, alumni, representatives of local authorities and parents of students are invited as members of the jury to evaluate the Student's Independent Work. To motivate students, moral and material rewards from employers are encouraged. The involvement of students in independent is well organized.

Every year, students of the direction "Technology of production and processing of agricultural products" participate in the Student Independent Work contests. New forms of learning technologies are practised and implemented, and new programmes are used.

For the implementation of the teaching process, classrooms have been set up in which related teaching disciplines are taught. The classrooms are equipped with necessary training equipment, demonstration materials, teaching materials and textbooks with their full descriptions. All necessary information is given in the passport of the classroom in accordance with the provision of the classroom.

In the building of ATF NSU there is a building plan, the area of which is 3993 m2, 235 full-time students' study at the faculty, because of which there is 17 m2 for each student.

External investments are attracted for complete high-quality repairs through projects. As a result of cooperation, the laboratory classroom was renovated. For experimental work, the laboratory room is equipped with an uninterrupted water supply.

Laboratories available for research:

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All necessary conditions have been created for conducting scientific research of students. Using the equipment available at the department, the following studies can be carried out using the existing laboratory equipment:

- Determination of physical and chemical parameters of milk and dairy products
- Monitoring of water quality
- Soil monitoring
- Air monitoring
- Microbiology
- Field laboratory for the determination of water quality.

NSU has 3 reading rooms at the library, each of them is designed for 30 seats. The library has an electronic reading room. Students have access to electronic resources of the Internet, websites, ABS Irbis-64, e-books, KYRLIBNET websites. Work is underway to post materials, teaching aids for students' self-study in electronic format on the Internet (http:// avn.nsu.kg).

On the initiative and with the active support of the NSU a Rector's Office, with the beginning of the 2020-21 academic year, major repairs and reconstruction of the reading room, electronic room, subscriptions, and the foyer are being carried out and completed in the scientific library. In 2019, educational literature was purchased in the amount of 1.419.498 soms (13.916 Euro official rate of the National Bank of the Kyrgyz Republic as of 01.01.2021). 78.148 soms were allocated for subscription to periodicals (766 Euro is the official rate of the National Bank of the Kyrgyz Republic as of 01.01.2021).

The library fund of the NSU named after S. Naamatov is 98.618 books.
The state of the library fund is shown in Table 1.

Scientific library of NSU	Library fund						Amount of funds spent on new receipts (thousand soms) For the period 2018-2020
	Total number of storage units (thous. units)	Number of annual subscriptions		New arrivals for the period 2018-2020		Electronic versions of books	
		Domestic	Foreign	Number of copies (units)	Number of titles (units)		
Main building				3920	350	2723	
Building 2				4044	2244	-	
TOTAL	102 081	17	4	7964	2594	2723	24056 Euro

Table 1 - Library collection by buildings

Digital resources available (online conference facilities, Moodle system, distance learning tools, etc)

Implementation of the MOODLE education system is being piloted; and online platforms are being used: Zoom https://zoom.us/, Google Classroom, https://classroom.google.com/, Google Form, https://www.google.com/intl/ru/forms/about/ Kahoot, https://kahoot.com/ Inshot, https://inshot-editor.ru.uptodown.com/android/download, Power Point Export, https://support.office.com/en-

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us/article/export-a-presentation-6ee4272e-8f64-47f6-bd32-12fe50eef477 и средства связи Whatsapp, https://www.whatsapp.com/ Telegram https://web.telegram.org/#/login.

The following material and technical equipment are available for the teaching process at NSU:
1) a sports hall for physical education,
2) classrooms-audiences, equipped with an ordinary blackboard, desks, chairs - for lectures and practical classes,
3) an audience for conducting classes in an interactive form, equipped with modern audio and video equipment (music center, DVD-player, video camera, interactive board, projector),
4) a classroom equipped with visual teaching aids, drugs, materials for teaching various disciplines,
5) a language laboratory for learning foreign languages,
6) computer classes equipped with modern technology.

All classrooms are issued with classroom passports, which contain their educational and methodological provision, a list of equipment, media resources, including electronic resources.

2.2.6.4 Available knowledge sources

NSU Library is responsible for knowledge sources storage and maintenance.

Description
Scientific data bases available and used by academic staff and by students
For effective interaction between teachers and students at the university, a competition for student research work is held every academic year. The qualifying stage of the SRWS competition is held at the faculty. The students who take the first three places, participate in the NSU competition, organized by the monitoring center. Employers are invited as a jury; the winners of the competition are encouraged by employers. The best work of students is encouraged with moral and material rewards by employers. The university has a mechanism to support talented students. This includes science clubs, Olympiads, and research competitions among students. The following main indicators are used to assess the effectiveness of R&D: the number of students involved in R&D, the implementation of R&D results in the educational process and in production. Every year, the Agrarian and Technical Faculty holds a competition for the best scientific work of a student, the winners of which participate in competitions held by the university, where the mechanisms for stimulating the research work of students and their scientific leaders are improved. One of the forms of students' involvement in R&D is participation in the university subject Olympiad, which develops their professional knowledge. In 2019, the Department of Languages held a subject Olympiad in English. Coursework of students is of a research nature, corresponds to the scientific theme of the department “Agrarian and technical problems of the Naryn region”.
Literature directly related to the addressed fields of science (in English, acquired during last 10 years)
The list of material and technical support includes personal computers and workstations connected to local networks with Internet access, equipped with modern software and methodological complexes for

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gaining knowledge and acquiring skills to solve problems in all types of professional and natural science training (programming environments, modelling, database management systems, computer graphics and geometric modelling packages).

On initiative and with the active support of the NSU Rector's Office, major repairs and renovations of the reading room, e-room, lounge, and foyer are being carried out and completed at the beginning of the academic year 2020-21 in the science library.

2.2.6.5 Practice during studies

- *Where students go for practice?*

Students undertake practical training in foreign and domestic agricultural enterprises, associations of farmer households, processing enterprises and agro-companies, production workshops and small processing enterprises. NSU also has its own training and production facility for the processing of milk and dairy products for student internships.

- *Do they search for practice by themselves or there is agreement between HEI and enterprises?*

Practices are carried out either by the students themselves or based on signed contracts.

- *How is practice organized and supervised? What are schemes and mechanisms?*

The practice has its own approved program. According to the curriculum, a practice leader, consultant, and a place of practice are defined. The student is given an individual plan and assignment, a diary, and a referral to practice. The student's work placement is recorded at the enterprise where he or she is interning. At the end of the internship, the student shall submit a report, internship diary and a tear-off part of the referral with the stamp of the enterprise. A representative of the enterprise, i.e., practice supervisor from the enterprise where the student was placed during the practice, gives a characteristic to the student. Practice is supervised by: Department of Internship, Head of Department.

- *What is approximate % of students returning to practice companies as specialists after graduation*?

Up to 3-5%.

Are there any motivation instruments to encourage enterprises to intake students for practice?

Employers are interested in qualified personnel with the necessary knowledge and competencies to perform work in the context of digitalization and the development of domestic agribusiness and the production of high-quality products. In this regard, during the internship, they evaluate and employ the best students.

2.2.6.6 Academic staff capacity building measures

Is there an internal capacity building system at the HEI/faculty?

Continuous professional development of teachers is being carried out. Improving the professional competencies of the staff of the university in modern conditions is another important task. The NSU Education Quality Assurance Department is a prerequisite for the effective operation of the entire

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university. Professional development of scientific-pedagogical and administrative-managerial personnel in various forms is part of the human resources policy and is considered as the most important criterion in assessing the activities of NSU. The professional development of university staff is carried out through a combination of self-education, training in specially created programmes and courses at NSU and other HEIs, internships in specialist HEIs in the Kyrgyz Republic and abroad, and participation in seminars. Every year NSU holds seminars, round tables, and training sessions to improve the qualifications of the teaching and support staff.

NSU has a well-established electronic system for sending information about conferences, internships, projects.

Since 2010, every year during the winter holidays, the Center for Education Quality Management has been organizing special advanced training courses, following the monitoring results; it conducts, and coordinates seminars aimed at improving the quality of education. Every year the university conducts seminars, trainings, conferences, organizes round tables on topical issues of education, the use of credit technologies and new innovative teaching methods. For this the requirements of new state standards and regulatory legal acts (NLA) in the field of education are considered. NSU systematically conducts professional development courses aimed at the development of human resources capacity. There are seven centres and one laboratory in the main building (three interactive whiteboards, presentation screens, projectors).

Seminars are followed up by practical and lecture sessions using interactive methods and updated curricula. During the promotion courses, there are parallel seminars aimed at improving professional competences.

- *Are there specialized (thematic) and English courses organized at HEI/faculty for academic staff? How often?*

There are language-training centers at NSU, where foreign language courses for teachers are systematically organized. Teachers participate in various competitions, where the result can be an enhancement of the level of the English language. An example of this is “Certificate of English”, where teachers take an English course in India. Thematic seminars, online webinars, lectures on the problems of the quality of education, science, etc. are regularly organized.

- *Is there any motivation system for academic staff increasing capacity on their own initiative and resources?*

Naryn State University has adopted and implemented the Regulation "On Awards of Naryn State University" (15 September 2016 No. 1/5). According to it, teachers are awarded a certificate of merit for good performance, a medal named after Satybaldy Naamatov, and are nominated for an award to higher authorities. Both material and moral incentives are used as conditions for recruiting, motivating, and retaining teachers at NSU. Thus, bonuses and gifts are provided. To carry out scientific research and complete a PhD or doctoral dissertation, a sabbatical leave of 1 to 6 months with pay is provided. The rectorate of the university also provides financial assistance to researchers for the publication of an abstract and a monograph.

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2.2.7 SWOT analysis, conclusions, and recommendations

2.2.7.1 SWOT analysis

Strengths	Weaknesses
- The only university in the Naryn region - Availability of a training and production site for the processing of agricultural products - Cooperation with foreign universities	- Insufficient provision of educational, technological and laboratory equipment and literature - Low interest of students in the study of agriculture
Opportunities	**Threats**
- Agricultural region: Favorable region for livestock breeding - Interest of state stakeholders of development of agrosector	- Political instability - A small number of manufacturing organizations (factories, etc.)

2.2.7.2 Conclusions and recommendations

It is necessary to improve the qualifications of teachers. Furthermore, it is important to strengthen the training base (laboratories and literature). The availability of a training and production site for the processing of agricultural products is an advantage for the increase of the practical exercises, which is necessary to improve the study environment and opportunities and to enhance the skills match between education and industries. The cooperation with companies shall be intensified. In this way, we can motivate and increase the interest of the younger generation to study agriculture. The launched cooperation with foreign universities can contribute to a vivid know-how transfer and exchange. The interest of the state stakeholders in the development of agrosector is an important pre-condition for the support of changes and new initiatives fostered by the current project.

2.2.8 Academic staff to be involved in the project (capacity building activities, the new curricula development and its further implementation)

Title (Prof., Dr., MSc., etc) *, degree, name and surname	Field of science	Thematic, subjects in academic work	Field/area in the new curricula
Baibagyshov Ermek Muratkanovich- Candidate of Agricultural Sciences, Acting	Agriculture		Crop production
Gulzana Kurmanalieva	Economic direction	Organisation of Production and Entrepreneurship in Agribusiness, Management and Marketing	Agricultural management/entrepreneurship

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Egenberdi Duishekeevich Moldaliev - Candidate of Technical Sciences, Acting Professor, Dean of the Faculty	Technical direction		
Otorova Saira Tursunovna- Ph.D., Head of Department	Technical direction	- Multimedia technology in professional work - Refrigeration engineering and technology - Water supply and water quality control	Production technique and technology
Degembaeva Nadira Kalchakeevna- Ph.D., associate professor	Technical direction	- Design and construction of small-scale processing plants - Basics of crop production	Fundamentals of crop production
Shermatov Sagynbek Makelenovich- Ph.D., Acting professors	Agriculture	- Biochemistry - Fundamentals of Microbiology - Microbiology of food - Biochemistry with-x. products - Fundamentals of Veterinary Medicine and Animal Reproduction Biotechnology - Sanitation and hygiene in processing plants - Slaughtering technology - Fundamentals of animal husbandry - Morphology and physiology of animals - Veterinary and sanitary examination of agricultural products	Biochemistry of agricultural products
Akmatov Kuban Kaldybekovich- Teacher	Agriculture	Agrochemistry with basic soil science	Agrochemistry
Zhaparov Adilet aspirant	Socio-economic	Plant physiology	Plant physiology
Azhybayeva Aisalkyn- teacher	Agriculture	Technology to produce flour and flour products	production technology
Akylbekova Iskra Kubanychbekovna- teacher	Agriculture	- Crop production - Storage and processing technology for crop products - Standardization and certification of agricultural products - Processing facilities equipment - Food technology - Physiology of nutrition	Storage and processing technology for crop products

		- Fundamentals of biotechnology of agricultural products - Selection of agricultural crops - Sensory food analysis - Food packaging materials and storage techniques - Technology of milk and dairy products - Meat Processing Technology - Technology for processing eggs - Technochemical Control in Production and Processing of Agricultural Products - Food Safety	
Kalmuratov Samat Kaldybaevich- teacher	Agriculture	- Food engineering - Food Processes and Apparatus - Introduction to the specialty	Food engineering

2.2.9 Impact expected with support of the project from perspective of involved HEI

What are your expectations regarding the impact of new content on students?	
Regarding the knowledge	- Veterinary regulations, technology for housing, feeding, care and reproduction of farm animals. - Types of crop and livestock productivity and monitoring methods. - Existing standards and specifications for crop and livestock products; the main methods for assessing product quality.
Regarding skills	- To determine the species, breed, fatness, live weight, mass, mast of agricultural animals. - To make technological schemes and calculations for the primary processing of crop and livestock products. - To monitor compliance with established requirements and existing regulations, rules, and standards at the enterprise. - To assess the quality and determine the quality grading of crop and livestock products.
Regarding competencies	- Select and implement technologies for primary processing of crop and livestock products. - Select and use methods for assessing and monitoring the quantity and quality of agricultural raw materials and crop and livestock products.

What are your expectations regarding the capacity building measures on academic staff?	
Regarding the knowledge	Knowledge to ensure the technological process of production
Regarding skills	Enabled to ensure the technological process of production
Regarding competencies	Ensure the entire technological process of production

2.3. HIGHER EDUCATION OFFER AT KYRGYZ NATIONAL AGRARIAN UNIVERSITY

2.3.1 Overview of all curricula related to the main addressed fields of science: agriculture, animal and dairy science, veterinary science, business and management

Type of data	Study years		
	2018/2019	2019/2020	2020/2021
Total number of study programmes **in agriculture science**, inter alias	*14*	*14*	*14*
Master level	*6*	*6*	*6*
Bachelor level	*8*	*8*	*8*
Total number of students in **agriculture science study programmes**, inter alias	*1882*	*2104*	*2249*
Master level	*90*	*85*	*84*
Bachelor level	*1792*	*2019*	*2165*
Total number of study programmes **in animal and dairy science**, inter alias	*2*	*2*	*2*
Master level	*1*	*1*	*1*
Bachelor level	*1*	*1*	*1*
Total number of students in **animal and dairy sciences study programmes**, inter alias	*58*	*78*	*86*
Master level	*10*	*8*	*6*
Bachelor level	*48*	*70*	*80*
Total number of study programmes **in veterinary science**, inter alias	*1*	*1*	*1*
Master level	-	-	-
Bachelor level	*1*	*1*	*1*
Total number of students in **veterinary science study programmes**, inter alias	*736*	*855*	*991*
Master level	-	-	-
Bachelor level	*736*	*855*	*991*
Total number of study programmes **in business and management science**, inter alias	*4*	*4*	*4*
Master level	*2*	*2*	*2*
Bachelor level	*2*	*2*	*2*
Total number of students in **business and management science study programmes**, inter alias	*854*	*995*	*1002*
Master level	*50*	*58*	*55*
Bachelor level	*804*	*937*	*947*
Number of academic staff members having master or doctor degree, inter alias	*19*	*21*	*25*
In agriculture sciences	*12*	*13*	*14*
In animal and dairy sciences	-	-	-

In veterinary sciences	*7*	*7*	*7*
In business sand management sciences	*-*	*1*	*4*
Number of students' international mobilities	*89*	*59*	*15*
Number of academic staff international mobilities	*142*	*107*	*12*

2.3.2 Regulations to be considered while modernization of curricula

1. DECISION OF THE GOVERNMENT OF THE KYRGYZ REPUBLIC of August 23, 2011, No. 496 on the establishment of a two-tier structure of higher professional education in the Kyrgyz Republic.

In accordance with the Law of the Kyrgyz Republic "On Education", to integrate higher professional education into the international educational space and increase the efficiency of the use of budgetary funds, the Government of the Kyrgyz Republic decides:

To establish a two-tier structure of higher professional education, with the assignment of academic degrees "bachelor" and "master", except for some specialties in the Kyrgyz Republic from the 2012-2013 academic year.

This document defines:

- Requirements for the implementation of the Bachelor and Master Core Curricula (BCC).
- The structure and scope of the programme.
- Requirements for staff, educational and methodological, material and technical support of bachelor's and master's programmes.

2. State educational standards of higher professional education in areas, basic educational programs, professional standards, National qualifications framework.

3. The accreditation of educational programs is carried out by national and foreign accreditation agencies based on established regulatory documents.

2.3.3 Internal study and curricula quality assurance systems and mechanisms

- *Who is measuring/assessing quality?*

The KNAU department of educational quality, together with the educational and methodological council, are engaged in the assessment of training and curricula. It conducts regular and systematic monitoring of the educational quality, monitoring of satisfaction of educational needs, the dynamics of the quality of educational services. It takes part in the licensing process for newly opened educational programs and in the accreditation of ongoing educational programs.

The main normative documents of the quality management system are:
• Regulations on the Council for the quality of education at KNAU
• Regulations on the internal quality system of education quality
• Regulations on the rating assessment of the activities of the teaching staff of KNAU
• Regulations on the questioning of students, professional teaching staff, employers
• Regulations on the verification of FQPs by the anti-plagiarism Internet system
• Criteria for evaluating educational programs of HPE (Higher Professional Education).

- *Frequency of the assessment?*

At the beginning of the academic year, the educational department, and the department of quality of education of the university assesses the readiness of the educational, methodological, financial and administrative support of the educational process. During each semester, an analysis of the applied teaching methods and technologies is conducted. Assessment on teaching quality and student testing results analysis, changes and additions to the educational process are presented at the end of the academic year in the form of an annual report in all areas.

- *What criteria are applied?*

- Availability of an educational program (learning objectives and learning outcomes), the quality of the Basic Education Program (MEP) in accordance with the state educational standard.

- To assess the teaching quality a rating of the individual achievements of the teaching staff (rating) has been developed; a survey of students and employers has been also conducted.

- *By whom findings are evaluated?*

Responsible for monitoring and measuring the quality of processes are:
- Commission for audit of educational program, created by order of the rector
- Department of Education Quality (OKO)- monitoring and auditing of all processes
- Department of Science- for ongoing research and development
- Deans of the faculties / directors of institutes, heads of the departments, heads of the personnelm department and the educational department are responsible for determining customer satisfaction
- Editorial and publishing department (EPD) - for educational and methodological support and publication of teaching materials and electronic educational resources.

- *Who is responsible for corrective measures to be applied?*

The Vice-Rector for academic affairs, the educational department (UO), the Department of education quality, Deans of faculties and Heads of graduating departments are responsible for educational services.

- What are the tools to promote quality?

Organization and conduction of trainings and seminars on the educational quality, organization of online courses for advanced training of teaching staff, thematic webinars, ranking of the teaching staff on academic and scientific work (number of scientific publications, participation in fundamental and applied research), conducting open lessons, master classes, competition "The best teacher of the year", "The best scientist", "The best graduate student", etc.

2.3.4 Collaboration with public sector institutions

Names of the main partners and their field/sector of activity	Agrarian sector (livestock, water management and land melioration, irrigation, veterinary medicine, biotechnology, molecular biology, agroengineering, organization and traffic safety, environmental protection and forest management, chemicalization and plant protection, phytosanitary control, soil-agrochemical control, State registration service, land management and registration of real property rights, cartographic and geodetic service, economic development, tax service, applied mathematics and economic and mathematical methods. 1. Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic.

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	2. State Selection and Pedigree Center of the Ministry of Agriculture and Food Industry of the Kyrgyz Republic. 3. Kyrgyz Research Institute of Livestock and Pastures. 4. Department of Pastures and Fisheries of the Ministry of Agriculture and Food Industry of the Kyrgyz Republic. 5. Department for the examination of agricultural crops of the Ministry of Agriculture and Food Industry of the Kyrgyz Republic. 6. Department of Water Management and Land Melioration of the Ministry of Agriculture and Food Industry of the Kyrgyz Republic. 7. Directorate of water management construction of the Department of water management and land melioration. 8. Melioration hydrogeological expedition under the Department of Water Management and Melioration of the Ministry of Agriculture and Food Industry of the Kyrgyz Republic. 9. State Inspectorate for Veterinary and Phytosanitary Safety under the Government of the Kyrgyz Republic. 10. Republican Center for Veterinary Diagnostics and Expertise. 11. Kyrgyz Research Institute of Veterinary named after of A. Dyishev. 12. Scientific Research Institute of Molecular Biology and Medicine in Kyrgyzstan. 13. Institute of Engineering Science (National Science Academy) in Kyrgyzstan. 14. State Agency of Environmental Protection and Forest Management in Kyrgyzstan. 15. Republican Pedologic-Agrochemical Station. 16. Department of Chemicalization and Plant Protection under the Ministry of Agriculture and Food Industry of the Kyrgyz Republic. 17. Department of Phytosanitary Control. 18. Kyrgyz Research Institute of Agriculture, Bishkek. 19. Botanical Garden of the National Academy of Sciences of the Kyrgyz Republic named after E.Z. Gareev. 20. Department of Environmental Monitoring, Forest, and Hunting Management. 21. Kyrgyz state natural park Ala-Archa. 22. Chui-Bishkek Department of Environmental Protection, regional departments of environmental protection. 23. Department of Environmental Strategy and Policy under the State Agency for Environmental Protection and Forest Management under the Government of KR. 24. Interregional Department of State Inspection for Environmental and Technical Safety, Bishkek. 25. State Registration Service under the Government of the Kyrgyz Republic. 26. Department of cadastre and registration of rights to immovable property at the State Registration Service under the Government of KR, city and district administrations for land management and registration of rights to immovable property. 27. State Cartographic and Geodetic Service of the Kyrgyz Republic. 28. State Design Institute for Land Management- KYRGYZGIPROZEM. 29. KYRGNII IRRIGATION, Bishkek.

	30. State Fund for Economic Development under the Ministry of Finance of the Kyrgyz Republic. 31. Bishkek Center for Testing, Certification and Metrology under the Center for Certification of the Ministry of Energy in Kyrgyz Republic.
Short description of collaboration	– The public sector is involved in determining the topic of Bachelor's / qualification graduate works, development and thisis defense (any level). – Practice is conducted in state institutions – Every year, employers participate in the work of the State Attestation Commission (State Attestation Commission), where they can express comments and suggestions for improving the educational program.
Results, benefits of the collaboration	
During various types of practices and internships, students acquire research skills and professional competencies in training areas and get acquainted with new educational technologies. In addition, students work independantly and acquire special skills in their chosen profession. Topics of final qualifying thesis and papers are defind during the undergoing pre-diploma practice on the example of a specific enterprise / organization.	
Vision on how this collaboration can be used for the new curricula development and provision	
Cooperation among the University and Partners (organizations, enterprises, companies) may be used for reformation of the current educational programs considering the new market demands (partners) and for development and providing new educational programs considering the changing demands and new competances for the future specialist.	

2.3.5 Collaboration with industries

Names of main partners and their field/sector of activity	- Milling industry- Yashar group LLC - Bakery products- PE Aliyev - Production of alcoholic and non-alcoholic beverages - PLC Bear Beer - Meat industry- "Steinbroy" CJSC, PLC "Ak-Kuu" - Dairy industry- Rikha LLC - Association of Dairy Producers "Kyrgyz-Sut" - Hi-Tech Park - Union of Cooperatives of the Kyrgyz Republic
Short description of collaboration	- The business sector is involved in the determination the topic of bachelor's / graduate qualification works, the solution and defense of dissertations (any level) - Practice is conducted at enterprises - Study tours to enterprises are organized - For several years field classes on special disciplines at the production bases of processing enterprises has been offered, where students have studied technological processes and various types of machines and equipment with the direct participation of specialists. - Representatives of the processing sectors participate in seminars, round tables for joint discussion and identification of problems of their solutions. - Every year, employers participate in the work of the State Attestation Commission (State Attestation Commission), where they could give comments and suggestions on improving the educational program. - Consultations are provided in the field of processing technologies for agricultural products on demand.
Results, benefits of the collaboration	
• Organization of the practice-oriented study (field classes, study practices). • Improvement the process of training specialists. • Garanteering the employment for students.	

Vision on how this collaboration can be used for the new curricula development and provision
• Engaging the employers to educational activities at the university as guest lecturers. • Constant meetings with employers for the discussion the current industry problems and the required special competencies for the respective professions. • Business planning, research and analytical projects. • Assistance in equipping educational laboratories with modern types of equipment for express analysis of food quality measures of raw materials and food products.

2.3.6 Detailed information on the curricula to be modernised

2.3.6.1 Curricula and its scope

Data, information required	Information
Title of the study programme	610400 – Zootechnics
Faculty/unit providing the study programme	The faculty of industrial technology and processing of agricultural products, department of livestock industrial technology named at M. N. Lushihin
Credits in national system /credits in ECTS	240
Duration of studies (in years)	4 years
Degree or qualification to be obtained	Bachelor
Knowledge to be obtained	Students gain knowledge in terms of productive livestock, zoophysiology, animal nutrition, animal breeding and pedigree records, sanitary-hygienic requirements on accommodations and livestock products, advanced manufacturing technologies and primary processing of livestock products, rational usage of pastures
Skills to be obtained	Fixation and general surveying of an animal, exterior assessment of animals, preparation of a ration, nutrition, maintenance of technical facilities and machines used in the production, primary processing, storage and transportation of milk, meat, regulation of the indoor climate, weighing animals, conducting primary and breeding records, and numbering animals.
Competencies to be obtained	The graduated student has the following competencies: - apply modern methods and techniques of keeping, nutrition, breeding and effective use of animals; - collect, analyze and interpret materials in the field of livestock; - use modern information technologies - able to justify specific technological decisions, taking into account the peculiarities of animal biology; - Able to predict the consequences of changes in nutrition, breeding and keeping animals; - carry out zootechnical assessment of animals based on knowledge of their biological characteristics; - ensure the rational reproduction of animals.

Whether, after completing the bachelor studies, there is a possibility to continue master level studies? Are there research needs and opportunities in the selected field? If yes, describe them	After completing their studies, bachelors can continue their studies in the master's degree programm, where they can conduct research under the master program - "Modern technologies for the production of livestock products (by industries)." Undergraduates, within the framework of the chosen dissertation topic, depending on the region, can conduct research on the branches of livestock: cattle breeding, sheep breeding, horse breeding, yak breeding, etc. During the implementation of the master's program the adaptation of livestock to climate change, the use of information technologies in the production of livestock products are considered
Further activities	Jobs in the graduate area, jobs in other agricultural areas, further studies the own university, studies at other universities, etc. Graduates can find employment in their specialty in state organizations and local governments, where a bachelor's qualification in zootechnology is required: ayilokmotu, zhayit committees, district administration for the development of livestock, in the structures of the Ministry of Agriculture, Processing Industry and Land Reclamation, and can also be experts in the field of animal breeding. Master's students can work in research institutes, continue their studies under the doctoral program (Phd), postgraduate studies, including in foreign universities (up to 1%).
Carrier opportunities per sectors	Public sector, private sector, self-employment on family farms, etc.

2.3.6.2 Structure of curricula to be modernised

Curricula blocks	Mandatory disciplines (in national credit system and in ECTS)	Optional disciplines (in national credit system and in ECTS)
Basic disciplines for the specialization area	- Fodder production and grassland management / 5 credits - Zoohygiene with Basic Design / 8 credits - Animals Breeding / 9 credits - Animal nutrition / 9 credits - Livestock production technology / 6 credits	- Organization of breeding / 3 credits - Dairy business / 3 credits - Zootechnical and breeding registration / 3 credits - Quality management / 3 credits.
Professional disciplines	- Cattle and Yak breeding / 9 credits - Sheep breeding / 9 credits - Livestock product standardization and certification / 3 credits - Processing technology for livestock products / 3 credits	

Research and practical work Practice TOTAL	- Prequalification training/12 credits - Field training/4 credits Academic training/6 credits 83 credits	 12 credits

Data, information required	Information
Title of the study programme	"Technology of production and processing of agricultural products"
Faculty/unit providing the study programme	Faculty of Technology of Production and Processing of Agricultural Products, Department of Technology of Processing of Agricultural Products named after prof. B. Sydykova
Credits in national system /credits in ECTS	240 credits
Duration of studies (in years)	4 years
Degree or qualification to be obtained	Qualification: bachelor
Knowledge to be obtained	The essence of technological processes and manufacturing technologies for the production, storage, and processing of raw materials of plant and animal origin, the essence of regulatory and technical documentation, the principles of operation of modern processing equipment, methods for assessing the quality and safety of raw materials and food products.
Skills to be obtained	Bachelors gain skills in the field of production and storage technology and processing of agricultural products: to draw up a technological scheme of production, calculate the consumption of raw materials and yield, be able to choose raw materials in accordance with the requirements of State Standard, conduct research on product samples, assess the quality and safety of raw products, determine the need for raw materials, containers, be able to manage production, choose the optimal production schemes.
Competencies to be obtained	• Graduate student of a training programm 610600- "Technology of production and processing of agricultural products" with "Bachelor" qualification in accordance with the objectives of the Society of Environmental Protection and the tasks of professional activity specified in paragraphs. 3.4 and 3.8 SES VPO, must have the following competencies: a) universal: • general scientific competences (GC): • GC – 1. Able to critically assess and use scientific knowledge about the world around him, orientate in the life values, culture and take an active civic position, show respect and tolerance to people; • instrumental (IC): • IC-1. Able to conduct business communication in the state, official and one of the foreign languages in the field of work and training; • IC-2. Able to acquire and apply new knowledge using information technology to solve complex problems in the field of work and training; • IC-3. Able to use entrepreneurial knowledge and skills in professional activities. • social, personal, and general cultural competences (SLC):

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	• SLC-1. Able to ensure the achievement the goals in the professional activities of individuals or groups. b) professional competencies (PC): • general professional: • is able to solve typical tasks of professional activity on the basis of knowledge of the basic mathematical, natural science laws and general professional disciplines using information and communication technologies (PC-1); • is able to use normative legal acts and compile special documentation in professional activities (PC-2); • is able to create and maintain safe conditions for the implementation of production processes (PC-3); • is able to implement modern technologies and justify their application in professional activities (PC-4); • ready to participate in experimental research in professional activities (PC-5); • can use basic knowledge of economics and determine economic efficiency in professional activity (PC-6). • production and technological activities: • is able to implement technologies for the production of crop and livestock products (PC-7); • is able to implement technologies for storage and processing of crop and livestock products (PC-8); • is able to implement technologies for storage and processing of fruits and vegetables (PC-9); • is able to assess the quality and safety of agricultural raw materials and products of its processing in accordance with the requirements of State Standart (PC-10); • is able to operate technological equipment for the processing of agricultural raw materials, taking into account various processes and devices (PK-11); • is able to use mechanical and automatic devices in the production and processing of crop and livestock products (PC-12); • organizational and management activities: • is able to organize the work of the collective of a subdivision of an agricultural enterprise (PC-13); • capable of making managerial decisions in various production and weather conditions (PC-14); • will be ready to manage the personnel of the structural unit of the enterprise, the quality of labor and products (PC-15); • research activities: • is able to apply modern methods of scientific research in the field of production and processing of agricultural products in accordance with the approved programs (PC-16); • is able to generalize and statistically process the results of experiments, formulate conclusions and proposals (PC-17); • can solve problems in the field of development of science, and technology, considering the normative legal regulation in the field of intellectual property (PC-18).
Whether, after completing the bachelor studies, there is a possibility to continue master level studies? Are there research needs and opportunities in the	After finishing the bachelor's degree, students can continue their studies at the master's degree. This gives them the opportunity to gain advanced knowledge about the production and processing technology of agricultural products. There is a need for research in the field of production and processing technology of agricultural products because agricultural enterprises need new developments in advanced

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selected field? If yes, describe them	technology and in development of product formulas, and comprehensive processing of production waste. Research opportunities in the chosen area are limited due to the lack of laboratory equipment, reagents for scientific research.
Further activities	Jobs in the graduate field- 38% Jobs in a different field- 31 % Continue studying in their universities– 31%
Carrier opportunities per sectors	Public sector, private sector, self-employment on family farms, etc.

Curricula blocks	Mandatory disciplines (in national credit system and in ECTS)	Optional disciplines (in national credit system and in ECTS)
	HUMANITARIAN, SOCIAL AND ECONOMIC CYCLE Kyrgyz language and literature (Russian) Russian language Foreign language History of Kyrgyzstan Manas studies Geography of Kyrgyzstan Philosophy 28 credits	Variable part, incl. student's obtional disciplines: Economy 2 credits
Basic disciplines for the specialization area	MATHEMATICAL AND NATURAL SCIENCE CYCLE Informatics Mathematics Physics Chemistry Ecology 17 credits	Variable part, incl. student's optional disciplines: Chemistry History of processing of agriproducts 6 credits
Professional disciplines	- Phytophysiology and agrochemistry with the basics of soil science - Morphology and physiology of agricultural animals - Microbiology of food - Biochemistry of agriproducts - Fundamentals of Veterinary Medicine and Animal Reproduction - Biotechnology - Production of crop and livestock products - Storage technology and processing of crop and livestock products - Standardization and certification of agricultural products processing equipment	Optional part, incl. student's optional disciplines: *Educational Profile "Technology of production and processing of livestock products"* - Facilities and equipment for storing livestock products - Technochemical control of agricultural products raw materials and processed products - Milk and dairy products technology

	- Organization of production and entrepreneurship in the agro-industrial complex - Health and Wellness - Food technology and engineering - Physiology of nutrition - Food chemistry - Fundamentals of biotechnology agriproducts - Refrigerating engineering and technology - Food research methods - Banking and Finance - Design and construction of small processing enterprises - Food Processes and Apparatus and Membrane Technology - Sanitation and hygiene in processing plants - ACS of technological processes - Management and marketing 108 credits	- Technology of meat and meat products - Fish and fish products technology - Poultry processing technology - Food supplements - Drying technology - Biological safety of food *Educational Profile "Technology of production and processing the crop products"* - Facilities and equipment for storage of crop production - Technochemical control of agricultural products raw materials and processed products - Bread, pasta, and confectionery technology - Flour and cereal technology - Fruit and vegetable processing technology - Fermentation technology - Food supplements - Drying technology - Biological safety of food 49 credits
Research and practical work		
Practice	- Educational training - Engineering and manufacturing training - Undergraduate practice 16 credits	-
TOTAL	**240 credits**	

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Data, information required	Information
Title of the study programme	Agronomical science
Faculty/unit providing the study programme	Department of crop production and Plant Protection
Credits in national system /credits in ECTS	240 credits
Duration of studies (in years)	4 years
Degree or qualification to be obtained	Bachelor in Agronomy
Knowledge to be obtained	Able to: - critically evaluate and use scientific knowledge about the world around us, navigate the values of life, culture and take an active civic position, show respect for people and tolerance (general professional) instrumental (IC): - conduct business communication in the state, official and in one of the foreign languages in the field of work and training (IK-1); - acquire and apply new knowledge using information technology to solve complex problems in the field of work and training (IC-2); - use entrepreneurial knowledge and skills in professional activities (IC- social-personal and general cultural (SLC): - ensure the achieving goals in the professional activities of individuals or groups (SLC-1).
Skills to be obtained	Able to: - acquire and apply new knowledge using information technology to solve complex problems in the field of work and training (IR-2); - carry out agrotechnical methods of growing crops - social, personal, and general cultural competences (SLC): - ensure the achieving goals in the professional activities of individuals or groups (SLC-1).
Competencies to be obtained	Must have competence in: - general professional competences, - the appliance of the basic principles of natural sciences in professional activities, apply the methods of mathematical analysis and modeling of theoretical and experimental research, - protecting methods of production personnel and the population from the consequences of accidents, catastrophes, natural disasters, - recognizing by morphological characteristics the most common wild plants and agricultural crops in the regions, to assess their physiological state, adaptive potential and factors for improving the growth, development and quality, - the usage of microbiological technologies in the practice of production and processing of agricultural products, - recognizing the main soil types and varieties, using directions in agriculture and methods of fertility reproduction, - establishing compliance with agricultural landscape requirements of agricultural crops when they are placed on the territory of land use.
Whether, after completing the bachelor studies, there is a	There are master courses in educational profile: - Agronomy

possibility to continue master level studies? Are there research needs and opportunities in the selected field? If yes, describe them	- Phytosanitary control and plant protection; Selection and seed production, Agrochemistry and soil science. There is an opportunity to study in postgraduate courses (PhD courses): - Crop Production - Plant Protection and Plant Selection.
Further activities	Specialists can work in organizations under the Ministry of Agricuture Food Safety and Melioration and private farms.
Carrier opportunities per sectors	Public Sector, private sector, self-employment on family farms, etc.

Curricula blocks	Mandatory disciplines (in national credit system and in ECTS)	Optional disciplines (in national credit system and in ECTS)
Basic disciplines for the specialization area	Genetics 1 credit Botanics 2 credits Plant Physiology 2 credits Soil sciences 3 credits, other thematic 20-25 ECTS	Comprehensive basis of accounting 1 credit Agricultural Economy 2 credits
Professional disciplines	Crop Production Agrochemistry Breeding and seed production Meadow growing Fodder production Plant protection And other thematic 140-160 ECTS	5 ECTS
Research and practical work	15	
Practice	50	
TOTAL	225-250	8

Teaching and learning activities	
Activity	Proportion of typical student workload (%)
Lectures	25
Reading & self-study	Extra-curricular
Watching Media	Extra-curricular
Individual assignments	15
Group assignments	10
Laboratory work	25
Field visits	25
Other (Please specify)	

How many hours per week is a student expected to spend on studying, i.e., on all activities above together?

The student load in one semester is 30 credits. 1 credit is equal to 30 academic hours. In the semester, 900 hours are provided, of which 50% are classroom, i.e., 450 hours. Every day, a student is engaged in 6 hours for 15 weeks (semester duration). The other 450 hours the student is engaged outside the classroom.

2.3.6.3 Existing study and research infrastructures (acquired during the last 10 years and fully functional)

Description
Learning facilities, including distance learning possibilities:
In KNAU, educational programs are traditionally implemented in internal study form and extramural/remote study form. However, in connection with the pandemic, they switched to a hybrid training system, in which lectures are held on-line, practical classes are in-person. The center of distance education is functioning. For each discipline and each type of training programs, the optimal format has been determined using on-line learning technologies. Each student from his personal account can observe changes and receive additional educational materials and links to online classes.
Laboratories available for studies:
KNAU has the following laboratories for teaching students: - Virtual laboratory of logistics of the agro-industrial complex - Water quality analysis laboratory - Soil and Plant Analysis Laboratory - Phytosanitary control laboratory - Kyrgyz Japanese Agrochemical Laboratory - Laboratories for molecular biological research For studying the quality of fodders, meat and milk, the laboratories are outdated and need modernization.
Laboratories available for research:
- Virtual laboratory of agro-industrial complex logistics - Water quality analysis laboratory - Soil and Plant Analysis Laboratory - SD laboratory – modelling - Phytosanitary control laboratory - Automatic satellite weather station - Kyrgyz Japanese Agrochemical Laboratory - Laboratories for molecular biological research - Laboratories of Veterinary Medicine under the Research Institute
Digital resources available (online conference facilities, Moodle system, distance learning tools, etc):
KNAU has 2 conference halls: a conference hall for 20 and 40 seats, the AVN training information system, and a distance learning center.

2.3.6.4 Available knowledge sources

Structural units, responsible for knowledge storage and maintenance:

- Faculty of Veterinary Medicine and Biotechnology
- Faculty of Hydro reclamation, ecology, and land management
- Technical and Economic College
- KNAU Agrotechnical College named after S. Ibraimov

- KNAU Aquaculture Center
- Kyrgyz Research Institute of Veterinary Medicine (KRIVM) named after A. Duisheeva
- Bishkek Agroeconomic College named after S.O. Tursunov.
- Tokmok Agroindustrial College

Description
Scientific data bases available and used by academic staff and by students
1. Scientific and electronic library of KNAU. 2. Reading room of the Faculty of Veterinary Medicine and Biotechnology (FVMiB). 3. Reading room, subscription, fiction literature, Faculty of Hydromelioration, Ecology and Land Management (FHMEiLM). 4. Library of the KNAU Technical and Economic College. 5. Library of the KNAU Agrotechnical College named after S. Ibraimov. 6. Electronic library of the Aquaculture Center- FishEDU. 7. Republican Scientific Agricultural Library of Kyrgyz Research Institute of Veterinary Medicine (KRIVM) named after A. Duisheeva. 8. Library of the Bishkek Agroeconomic College named after S.O. Tursunov. 9. Library of Tokmok Agroindustrial College.
Literature directly related to the addressed fields of science (in English, acquired during last 10 years) 1. Abbas AK, Lichtman AH. Cellular and Molecular Immunology. Fifth Edition. 2003. One book 2. Alberts B, Johnson A, Lewis J, Raff M, Roberts K, Walter P. Molecular Biology of The Cell. Fourth Edition. 2002. One book 3. Alberts B, Johnson A, Lewis J, Raff M, Roberts K, Walter P. Molecular Biology of The Cell. Fourth Edition. 2002. One book 4. Campbell, Reece, Mitchell. Biology. Sixth Edition. 1999. One book 5. Campbell, Reece. Biology. Seventh Edition. 2005. One book 6. Campbell, Reece. Biology. Ninth Edition. 2011. One book 7. Edwards P, Kaewpaitoon K. Fish Culture for Small-Scale Farmers. 1984. One book 8. Emmel TC. An Introduction to Ecology & Population Biology. 1993. One book 9. Food and Agriculture Organization of United Nations. What is the Code of Conduct for Responsible Fisheries? 2001. One book 10. Food Cycle Technology Source Books. Fish Processing. 1993. One book 11. Freeman S. Biological Science. Second Edition. 2005. One book 12. Garrett, Grisham. Biochemistry. Third Edition. 1997. One book 13. Hickman, Robets, Larson. Integrated Principles of Zoology. Eleventh Edition. 2001. One book 14. Lewin B. Genes VII. 2000 One book 15. Louw G. Physiological Animal Ecology. 1993. One book 16. Madigan, Martinko, Parker, Brock Biology of Microorganisms. Ninth Edition. 2000. One book 17. Moyle, Cech. Fishes. An Introduction to Ichthyology. Fourth Edition. 2000. One book 18. Nelson DL, Cox MM. Lehninger Principles of Biochemistry. Third Edition. 2000. One book 19. Piper, McElwain, Orme, McCraren, Flowler, Leonard. Fish Hatchery Management. One book 20. Pollard TD, Earnshaw WC. Cell Biology. 2002. One book 21. Reece, Urry, Cain, Wasserman, Minorsky, Jackson. Biology. Ninth Edition. 2011. One book 22. Smith L.S. and Bell, G.R. A practical guide to the anatomy and physiology of pacific salmon. One book 23. Stickney, Robert R. Culture of nonsalmonid fish freshwater fishes. 1986. one book

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24. Healthy fish. Prevention, diagnosis and diseases treatment / Riita Rahkonen, Pia Wennerström, Päivi Rintamäki –Kinnunen and Risto Kannel 2003 Rahkonen R,
25. Vennerström P, Rintamäki-Kinnunen P, Kannel R. Terve kala / Healthy Fish - in Russian. Riistan- ja kalantutkimus. 2003. three books

1. Keep Asia Green. Don Koo LEE and Yeong Dae PARK
2. Plant Mutation Breeding and Biotechnology. Edited by Q.Y. Shu, B.P. Forster and H. Nakagawa
3. Botany. Randy Moore, W. Dennis Clark, Kingsley R. Stern
4. Taxonomy and Pathology of Cylindrocladium (Calonectria) and Allied Genera. Pedro W. Crous
5. The Cropland Crisis. Pierre R. Crosson
6. ENERGY POLICY in the GREENHOUSE. Florentin Krause
7. NONTARGET EFFECTS of AGRICULTURAL FUNGICIDES. Subhash C. Vyas
8. ECONOMICS OF AGRICULTURAL DEVELOPMENT. George w. Norton Jeffrey Alwang
9. Crown Gall Advances in Understanding Interkingdom Gene Transfer. Walt Ream and Stanton B. Gelvin
10. Protein Nutrition in Ruminants. E. R. Orskov
11. The Nature of Wilt Diseases of Plants. C. H. Beckman
12. The God of Small Things. Arundhaty Roy
13. Insect Pests of Small Grains. Wendell L. Morrill
14. Managing Diseases in Greenhouse Crops. William R. Jarvis
15. POSTHARVEST BIOTEHCHNOLOGY of SUGAR CROPS. D. K. Salunkhe, B.B. Desai
16. RECLAMATION of SURFACE-MINED LANDS. Lloyd R. Hossner
17. Timber Supply Land Allocation, and Economic Efficiency. William F. Hyde
18. WINNING WITH WATER SOIL-MOISTURE MONITORING FOR EFFICIENT IRRIGATION. Gail Richardson and Peter Mueller-Beilschmidt
19. Essential Plant Pathology. Gail L. Schumann and Cleora J. D'Arcy

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2.3.6.5 Practice during studies

Where students go for practice?

Students undergo practical training in foreign (Germany, Denmark, Sweden, Norway, the Netherlands, Austria) and domestic agricultural enterprises, associations of farm enterprises, processing enterprises and agricultural companies, farms. KNAU also has its own educational facility and educational- scientific and innovation center for students to undergo practical training.

Do they search for practice by themselves or there is agreement between HEI and enterprises? Practices are carried out both by students themselves and based on signed contracts. How is practice organized and supervised? What are schemes and mechanisms?

The practice has its own approved program. According to the curriculum, a practice leader, consultant, and a place of practice are defined. The student is given an individual plan and assignment, a diary, and a referral to practice. The student's work placement is recorded at the enterprise where he or she is interning. At the end of the internship, the student shall submit a report, internship diary and a tear-off part of the referral with the stamp of the enterprise. A representative of the enterprise, i.e., practice supervisor from the enterprise where the student was placed during the practice, gives a characteristic to the student. Practice is supervised by: Department of Internship, Head of Department.

What is approximate % of students returning to practice companies as specialists after graduation?

Up to 3-5%

Are there any motivation instruments to encourage enterprises to intake students for practice? If yes, describe them?

Employers are interested in qualified personnel with the necessary knowledge and competencies to perform work in the context of digitalization and the development of domestic agribusiness and the production of high-quality products. In this regard, during the internship, they evaluate and employ the best students.

Academic staff capacity building measures

Is there an internal capacity building system at the HEI/faculty? If yes, describe, what it includes and how is organized?

KNAU has developed a teacher rating system, annual reward for the best teachers based on academic and scientific achievements. Advanced training courses are held for young teachers.

Are there specialized (thematic) and English courses organized at HEI/faculty for academic staff? How often?

In KNAU, a language training center and a language laboratory provide foreign language courses for teachers are systematically organized (3 times a week). Moreover, thematic seminars, online webinars, lectures on the problems of educational quality, science, etc. are regularly organized.

Is there any motivation system for academic staff increasing capacity on their own initiative and resources?

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During the competitive selection for faculty teaching staff positions (every 5 years), academic and scientific achievements, awards, incentives, personal rating of teaching staff are considered. The best teachers, employees of KNAU are awarded based on their performance during the academic year. Teachers can undergo scientific internships, Career enhancement training, participate in scientific conferences, seminars within the framework of project activities, at the expense of the university budget and at their own expense. Participation is confirmed by certificates.

2.3.7 SWOT analysis, conclusions, and recommendations

2.3.7.1 SWOT analysis

Strengths	Weaknesses
▪ KNAU is the educational and methodological association that supervises all educational programs in the field of agriculture ▪ KNAU has clearly formulated strategy ▪ Highly qualified scientific and pedagogical staff ▪ Good material and technical support and laboratory-experimental base ▪ Quality level of educational and methodological provision ▪ Stable communication with foreign and domestic stakeholders	▪ Limited financial resources ▪ Lack of communication with consumers ▪ Weak promotion and employment of graduates ▪ Personnel renewal ▪ Insufficient scientific capacity ▪ Dependence on state structures, weak autonomy of the university
Opportunities	**Threats**
▪ Internationalization of educational services ▪ Implementation of network system for the presentation of educational programs, joint with foreign universities of two-degree education. ▪ International recognition, comparability, and convertibility of awarded degrees and qualifications in agricultural specialties. ▪ Collaboration with other universities in the global educational space, especially with other members of the association who share high quality standards. ▪ Strengthening competitive positions in the world market of educational services.	▪ Growing number of universities with low quality training in agricultural areas ▪ Insufficient funding for the acquisition of advanced technologies

2.3.7.2 Conclusions and recommendations

The current project addresses key weaknesses and fosters key strengths and opportunities of KNAU: further development of the teaching staff research potential, update/upgrade and improvement of laboratories and educational base for conducting research and the process of teaching students based on innovative educational trends, teaching technologies and modern qualification requirements, strengthen collaboration with public sector institutions, industry, and agricultural sectors to actively apply a practice-oriented approach.

To ensure the sustainability of the project, it is necessary to actively disseminate the results of the project through trainings, seminars, summer schools, and online webinars. It is necessary to develop methodological manuals and guidelines for farmers, managers, and specialists of agricultural enterprises, intensively develop cooperative work with associations of private -farm enterprises, agricultural processing enterprises and future employers to improve the production and processing of livestock and

crop products, considering the requirements of international quality standards. In the modern agrarian labor market, graduates of agricultural universities should have professional and special competencies, team, and project work skills in international and domestic organizations. This will strengthen their competitiveness and motivation to work in the industrial and agricultural sector; it will furthermore strengthen our position as university and help to boost our rating in the educational services global market.

Modernization of the educational programs and educational process in ongoing development of two-degree education with foreign universities will contribute to sustainability and promotion of the goals and objectives of the project.

2.3.8 Academic staff to be involved in the project (capacity building activities, the new curricula development and its further implementation)

Title (Prof., Dr., MSc., etc)*, degree, name and surname	Field of science	Thematic, subjects in academic work	Field/area in the new curricula
Tolobekova Aijan PhD	Agriculture	Quality management process in animal breeding	Quality management process in animal breeding
Nurgazieva Asel	Biology	Biotechnology	Biotechnology
Asanaliev Abdibek PhD	Agronomy	Agronomy, crop production and plant protection	Crop production and plant protection
Abdieva Tchatchakei, MSc	Agronomy	Phytosanitary control	Phytosanitary control, agronomy
Ibraeva Nurulya	Economy, organization and management of the national economy	Agrarian management/Agro-marketing	Agrarian management/Agro-marketing
Derkembaeva Saltanat	Agrarian management/Agro-marketing	Management on APE	Food safety/green economy
Kaparova Elmira, diploma	Engineer technologist	Technologies for storage and processing of products of crop production	Technologies for storage and processing of products of crop production
Tarasova Svetlana, diploma	Engineer technologist	Technologies of storage and processing of livestock products	Technologies of storage and processing of livestock products
Alyikeev Ishenbek	Zootechnics	Production of animal breeding and nourishing, breeding business	Production of animal breeding
Kadyrova Tchinara	Veterinary	Ensuring veterinary and sanitary conditions	Veterinary

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Aitbekova Jazira, MSc.	Standardization, certification, and metrology of livestock products	Milk and meat production; animal feeding; Fundamentals of Veterinary Medicine and Zoo Hygiene Standards	Milk and Meat Production

2.3.9 Impact expected with support of the project from perspective of involved HEI

What are your expectations with regard to the impact of new content on students?	
Regarding the knowledge	Students will gain knowledge about world trends and standards for agricultural products, and their promotion in the food market.
Regarding skills	Students will learn how to apply new technologies in production: - to feed and keep animals; to produce milk and meat; - to apply methods for assessing product quality; - to organize appropriate conditions for functioning the technological processes.
Regarding competencies	Student's competences will gradually improve

What are your expectations with regard to the capacity building measures on academic staff?	
Regarding the knowledge	Students will gain knowledge about world tendences and standards for agricultural products production. Students will familiarize with new methods of teaching.
Regarding skills	Determination of product quality using modern technology.
Regarding competencies	New professional competencies and opportunities for teaching staff and its implementation.

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2.4. AGRICULTURE SECTOR AND ITS KNOWLEDGE NEEDS

2.4.1. Overview of the agriculture sectors

Main produce in crop farming
Cereals: wheat, corn, barley, millet, rice Vegetable crops: tomatoes, cucumbers, cabbage, etc. Fruit and berry: apple tree, pear, apricot, sweet cherry, plum, raspberry, strawberries, currant, sea buckthorn, melons and gourds, grapes Sugar beet Potato Nut Legumes: beans, chickpeas Buckwheat Tobacco Oilseeds Cotton
Main produce in animal farming
Milk Eggs Wool Meat Fish Honey

Number of enterprises	2017	2018	2019	2020
Small, inter alias	105 485	104149	106606	108569
In crop farming	-	17241	17410	17491
In animal farming	-	78696	79755	80392
Medium	323 245	323132	332879	341998
In crop farming	-	266055	271007	275978
In animal farming	-	22894	23635	23990
Large	460	427	464	-
TOTAL	27	26	31	-
Small, inter alias	**429 217**	**440 055**	**452 803**	

GDP of the agriculture sector, in EUR	2017	2018	2019	2020
Total GDP for agriculture, EUR	66386,8	66477,4	72219,0	80817,10
% in total country GDP	12,5	11,7	11,7	13,5
GDP per sub-sector (if data available):				
Crops	108 187,4	100 514,8	110 782,2	-
Animal	95 047,5	99 019,3	104 063,1	-
Mixed farming	-	-	-	-

Support activities to agriculture	4 873,5	4 926,7	5 326,8	-

Exports, in % from total production volumes	2017	2018	2019	2020
Total food exports, inter alias	1 764,3	1 836,8	-	-
Crop origin products	-	-	-	-
Animal origin products	-	-	-	-

Employment (in thousand)	2017	2018	2019	2020
Total employment in crop farming, inter alias	371,5	329,8	340,6	-
Employees with higher education	13.5	34,5	15,4	-
Employees with secondary professional education	15,7	26,9	19,3	-
Employees with general education (school level)	285,3	225,2	244,1	-
Total employment in animal farming, inter alias	68,6	31,4	47,2	-
Employees with higher education	3,6	3,0	3,2	-
Employees with secondary professional education	5,2	2,3	4,1	-
Employees with general education (school level)	43,6	21,7	28,4	-
TOTAL	440	361	388	-

2.4.2. Knowledge, skills, and competence needs of the agriculture sector

The information in this chapter is based on the assessment of questionnaires filled in by companies and/or organisations.

2.4.2.1. The sector's needs of specialists/professionals: required knowledge, skills, competencies.

As part of the study in KNAU named after K.I. Skryabin, in the field of animal breeding, only 4 farms and one representative from the Association of dairy farming "Kyrgyz-Sut", as well as the Association for the Development of the Agroindustrial Complex were interviewed. According to the survey results, the industry needs the following specialists: (indicated in descending order)

- Agronomists
- Agrotechnologists
- Veterinarians
- Livestock technicians
- Technologists
- Product quality managers

No	Demanded specialists in the field of APT (Agricultural Products Technologies)
1	Expert on storage technology and processing of crop products, fruits and vegetables and livestock products.
2	Expert on business plan development in production and processing of agricultural products.
3	Expert on Food Safety and Quality.
4	Diagnostic specialist in common diseases of farm animals and plants.
5	Expert on nanotechnology in agriculture.
6	Expert on satellite navigation systems, drones, and other technologies for data collection

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Experts and qualified agronomists, agricultural technologists (dairy and meat technologies), veterinarians (experts on artificial insemination), livestock experts (balanced cattle diet), laboratory experts and experts on laboratory research are needed. Skills and an increase offer of trainings of genetic and veterinary management, as well as in the above listed areas. Sector representatives highlighted the shortage of technologists, laboratory assistants, agronomists, experts on quality and food safety, and experts on storage of potatoes and other tuberous plants.

2.4.2.2. Sector's knowledge/ skills/ competence needs related to sustainable management

Knowledge of production technology, quality, and quantity of products according to Global G.A.P.:

- Management skills on corporate management.
- Skills on human resource management.
- Knowledge on business planning.
- Knowledge on standards and certification of agricultural products.

2.4.2.3. Sector's knowledge/ skills/ competence needs to introduce and maintain digital solutions

- Knowledge of foreign languages for understanding and transferring advanced world technologies.
- Computer literacy.
- Study of new technologies and equipment in agriculture.
- Experts on satellite navigation systems, drones, and other technologies for data collection.
- The use of IT technologies is necessary for farmers in the future. For example: flock management-electro-cattleman.
- Knowledge and ways of fulfilling the requirements of customs regulations during product export.

2.4.3. Overview of the sector-universities relation

The cooperation between the university and farmers must be enhanced. Now, the university is functioning separately, the production industry as well. It is necessary to strengthen the connection between these two elements by drawing up contracts for practically trained universal specialists. It is necessary to arrange master classes on topics, inviting foreign specialists, not only for students, but also for farmers.

Online learning courses for practicing farmers shall be developed and provided. Experts on balanced feeding and forage preparation from other countries shall be involved.

2.4.3.1. Current cooperation with universities

It is important to note that today cooperation between universities and large agricultural enterprises requires consolidated efforts and close cooperation in the field of scientific and applied research and training of demanded personnel. Thanks to such projects as "AgroDev" we can develop and consolidate interaction with enterprises of the agrarian industry.

2.4.3.2. Efficiency of higher education – relevance to business needs and development trends

Standards, for exmaple GAP, need to be implemented at farmers' enterprises. A curriculum with a focus on global best practice in the dairy sector shall be developed. Milk production standards must comply with export specifications. Modern production regulations and product quality requirements must be implemented in training curriculum.

2.4.4. SWOT of agriculture sector, conclusions, and recommendations

2.4.4.1. SWOT analysis

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Strengths	Weaknesses
• High share of vegetable production, fruits, meat, and dairy products • Territorial proximity to Russia and Kazakhstan markets and high demand for Kyrgyz products • Availability of farms • Availability of relatively cheap labor • Availability of trade channels for the livestock sale to neighboring countries • Availability of modern technologies for growing in greenhouses.	• Low share of agricultural exports in the total turnover of the Kyrgyz Republic • Poor technical equipment of laboratories and storage facilities, implementation of advanced technologies, innovations • Low competitiveness of agricultural products • Difficulty in sales markets access for small and medium agricultural producers • Low level of awareness of agricultural producers on the issue of international standards • There is no single database of manufacturers and manufactured products • Lack of coordination and small-scale trading of agricultural producers • Lack of highly qualified experts (consultants and extension providers) • High level of manual labor, lack of an automated production system • Lack of logistics centers • Potential decline in land productivity due to the monocultural structure of agriculture • Lack of access to foreign markets
Opportunities	**Threats**
• Development of agriculture export potential of improving the efficiency of agricultural land use (national priority) • Organization of breeding multipliers for breeding dairy and meet cattle • Possibility of intensifying production using modern technology and mechanization of manual labor (grants & investments) • Law on Labour Protection- 2019 • Law on the Development of Agriculture of the Kyrgyz Republic-2019 • Improvement of the state veterinary and sanitary inspection and control over the quality and safety of livestock products (know-ho transfer) • Increasing investment activity of agricultural enterprises, including from own sources, as well as strengthening their financial stability • Job creation through cooperation with enterprises in projects like AgroDev	• Market overstocking with imported non-organic agricultural products from nearby neighboring countries • Instability of political situation affects the decrease in investment attractiveness • Frequent changes in legislation, as well as the lack of necessary legal norms for the production and processing of products in accordance with international standards • Strict requirements of the major export markets for product and production management • Insufficient development of the agricultural risk insurance system

• Favorable natural and climatic conditions for the development of the agricultural sector • The presence of big natural pastures that determine the development of animal breeding, especially sheep, cattle breeding, and yak breeding	

2.4.4.2. Conclusions and recommendations with regard to the knowledge needs of agriculture sector

Summarizing on the above provided SWOT analysis the following knowledge needs of the agricultural sector have been identified:

- Knowledge of international standards for the agricultural products quality
- Knowledge of organic ecological products
- Knowledge of the green economy
- Knowledge of food safety
- Knowledge of nanotechnology in the agricultural and processing industry
- Knowledge of digitalization and development of skills in international and electronic commerce in the agricultural sector

2.5. POLICY FRAMEWORK and PUBLIC SECTOR BODIES ASSOCIATED to the AGRICULTURE

2.5.1 Policies, measures supporting introduction of good agriculture practice (GAP) and sustainable management

2.5.1.1. National strategies, policies, development programmes already adopted and under implementation:

Type of the document: 2 Programmes

Title:

1) Food Security Program in Kyrgyz Republic for 2019-2023 (approved by the Government of the Kyrgyz Republic by Decree No. 320 dated June 27, 2019);
2) Export Development Program in Kyrgyz Republic for 2019-2022 (approved by the Government of the Kyrgyz Republic by Decree No. 596 dated December 20, 2018).

Period for which the strategy is developed and introduced:

1) for 2019-2023

2) for 2019-2022

Short description of relation to the GAP or sustainable management:

1) The Food Security Program in the Kyrgyz Republic for 2019-2023 focuses on the development of the education / training and science on food safety and awareness raising of all actors of the value chain in GAP and sustainable management.

2) In the Export Development Program in Kyrgyz Republic for 2019-2022 an action plan for the implementation of research in international standards for food products (Organic, Global G.A.P, Fair trade, etc.) was elaborated.

Responsible for the implementation of international food industry standards are:

- Investment Promotion and Protection Agency
- Ministry of Agriculture, Food Industry and Land Reclamation of the Kyrgyz Republic (Department of Food Safety and Development of Food Quality)
- Ministry of Economy and Finance of the Kyrgyz Republic (Center for Standardization and Metrology)
- State Inspection for Veterinary and Phytosanitary Safety under the Government of the Kyrgyz Republic
- State Inspectorate for Environmental and Technical Safety under the Government of the Kyrgyz Republic

An Interdepartmental Working Group has been established, consisting of representatives of the Ministry, Kyrgyzpatent, Centre of Standartization and Metrology under the Ministry of Economy in KR, Academy of Sciences of the Kyrgyz Republic, representatives of universities (KEU and KNAU) and associations (meat industry, fish farmers, dairy industry, bean growers and beekeepers).

Objectives, tasks, relevant to the GAP or sustainable management, aspects:

- Improvement of food safety control infrastructure along the entire value chain (from field to plate)

- Enforcement of the requirements of the EAEU Technical Regulations

- Creating conditions for implementation of the Global G.A.P standard

- Determination of groups of manufacturers by region, product, volumes, areas, and creation of a unified database of manufacturers and manufactured products, raising awareness according to the Global G.A.P. Standard.

Financial instruments adopted for the strategy implementation:

Internal and external grants and investments

Web-site: http://agro.gov.kg; http://www.nism.gov.kg/;

2.5.1.2 International agreements, memorandums, and other understandings having impact on national initiatives associated to agriculture and its produce

- Framework Program for FAO Cooperation with the Kyrgyz Republic (from 2018 to 2022). It was developed considering the National Strategy 2040 and the National Strategy for Sustainable Development for 2018-2022. The main components of the new cooperation agreement between the Government of Kyrgyzstan

and the Food and Agriculture Organization of the United Nations are: improving nutrition, reducing poverty in rural areas, sustainable management of natural resources in Kyrgyzstan and adaptation to climate change. FAO's policy assistance and advice are also envisaged in three priority areas:

1) Developing and improving coherent and gender-sensitive policies and programs for agriculture, food security, nutrition, social protection and rural development;

2) reducing rural poverty by supporting smallholders;

3) sustainable management of natural resources and readiness for climate change and natural disasters.

- Within the framework of the project **"Demonstration project on the dissemination of national improved seeds of food crops and the transfer of agricultural technology: Distribution of seeds of improved varieties of barley in the Kyrgyz Republic (AFACI)"** with financial support from the Republic of Korea (2016- 2019). The aim of the project was to familiarize farmers and peasants with improved varieties of local and foreign selection of barley, distribution of seeds of improved varieties of barley. Responsible for the implementation was the Department for the Examination of Agricultural Crops (Bank-Laboratory of Plant Genetic Resources). 6 territorial subdivisions of the Department - state variety testing plots and stations located in different regions: Sokuluk complex GSU in Chui region, Ak-Suu State variety testing station in Issyk-Kul region, Bakai-Ata complex GSU in Talas region, Leilek rainfed GSU in Batken oblast, Kara-Suu complex GSU and Uzgen rainfed GSU in Osh oblast were involved in the project. In the period 2016-2019, according to the terms of the AFACI project, 18 regional seminars and field days were held to raise awareness of farmers, peasants, and breeders about new varieties of barley. The seminars were attended by over a thousand representatives of seed-growing, and private farms, as well as representatives of regional and district departments of agricultural development.

  According to the results of official tests and the results of the project, the following varieties were included in the State Register of approved varieties and hybrids in the territory of the Kyrgyz Republic: Strategist, Premium, Vladlen, Vakula, Maksat, Argul, EXPO 2017 and promising varieties: Leon, Schedry, Kalkyul.

- Within the framework of cooperation between the **Kyrgyz Republic** and the **International Fund for Agricultural Development (IFAD)**: The first stage of cooperation was identified by the Strategy for Poverty Reduction by Improving the Welfare of Villagers. The objectives of the strategy were to improve the management of natural resources; increase access of the poor to financial services; promote rural microenterprise development; secure land tenure. During the first phase, from 1996 to 2013, IFAD co-financed three World Bank projects worth US $ 20.4 million. The second phase of IFAD's activities in Kyrgyzstan started in 2011. The strategy, agreed with the Government of the Kyrgyz Republic, focused on improving livestock productivity, increasing stability of livestock communities to climate change, and strengthening the integration of small-scale livestock farmers. During the second phase, the following proper IFAD projects are financed:

  1. The project "Development of livestock and market- 1" (PDLM-1). Implementation period: 2013- 2019 (Officially completed on September 30, 2019). It covered the Issyk-Kul and Naryn regions. IFAD funding: US $ 10 million in grants, US $ 10 million in loans. Total- USD 20 million.

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2. The project "Development of livestock and market- 2" (PDLM-2). Implementation period: 2014- 2020 Covers Osh, Jalal-Abad and Batken regions.

3. The project "Ensuring market access" (EMA). Implementation period: 2018- 2023 Covers the entire republic.

2.5.2 Other public sector stakeholders involved in implementation or monitoring good agriculture practice

No	Title of the institution	Task, role of an institution
	Ministry of Agriculture, Food Industry and Melioration of the Kyrgyz Republic (MAFIiM)	- ensure food safety of the Kyrgyz Republic and the access of the country's population to basic food products; - implement a unified state policy in the field of production and sale of agricultural products, food and processing industries, ensuring a set of measures to protect consumers and local producers within the framework of the legislation of the Kyrgyz Republic; - increase the export of agricultural products and its products by supporting and forming effective private peasant (farmer) enterprises, agribusiness based on the creation of a competitive market management system in the country's agro-industrial complex; - organize and implement state control, accounting, and reporting in the field of production, processing and marketing of agricultural products, food, processing, and alcoholic industries.

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No	Title of the institution	Task, role of an institution
	National Statistical Committee of the Kyrgyz Republic (NSC)	The purpose of the NSC is to register a farm and document information about the farm, types of products grown, planting material, etc. The tasks of the National Statistical Committee are: - implementation of state policy in the field of statistics; - collection, processing, analysis and dissemination of statistical information on massive economic, social, demographic, environmental phenomena and processes taking place in the Kyrgyz Republic and its regions; - ensurance of reliability and cohesion of official statistic information; - ensurance of availability and openness of statistical information, its sources and compilation methodology; - development, improvement and implementation of scientifically based methodology; - development, improvement and implementation of a unified system of classification and coding of technical, economic and social information used for statistical observations; - creation and maintenance of the Unified State Register of Statistical Units; - action coordination of state authorities, local self-government and other legal entities in matters of organizing the collection and use of administrative data; - ensurance of interaction of the state statistical information system with information systems of state authorities and local authorities, international organizations and statistical services of other countries for the mutual exchange of information; - introduction of the latest information technologies for the processing of statistical information; - ensurance of reliable protection and storage of statistical information.

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No	Title of the institution	Task, role of an institution
	State Inspection for Veterinary and Phytosanitary Safety under the Government of the Kyrgyz Republic	The tasks of the Civil Service are: - implementation of state policy in the field of veterinary medicine, phytosanitary and food safety, - determination of the strategy and development priorities in the field of animal and plant health and food safety; - making proposals for improving the regulatory legal framework on veterinary, phytosanitary and food safety; - prevention, identification and prevention of legislation violation of the Kyrgyz Republic in veterinary and phytosanitary, product safety requirements established by technical regulations, as well as products subject to veterinary and quarantine phytosanitary control, and veterinary medicinal products in circulation in the territory of the Kyrgyz Republic; - prevention of introduction of quarantine harmful organisms to the territory of Kyrgyz Republic; - prevention of rules violations of mandatory confirmation of product certification; - organization of veterinary and sanitary, preventive measures of the spread of infectious animal diseases; - protection of the territory of the Kyrgyz Republic from the introduction and / or spread of infectious animal diseases on its territory. - state control and supervision in the field of veterinary medicine, phytosanitary and food safety; - organization and implementation of activities for identification, traceability of animals and registration of farms; - timely submission of reliable, qualified, diagnostic work on determination of the viral, bacterial, parasitic diseases of animals and plant quarantine, chemical-toxicological, radiological and other studies. - ensuring state regulation of the production, export and import of veterinary medicines, feed and feed additives.
	State Inspectorate for Environmental and Technical Safety under the Government of the Kyrgyz Republic	The aim of the State Ecological and Technical Inspectorate is to exercise state supervision and control over ensuring compliance with the norms and requirements of life safety and people health, flora and fauna, the environment, and the prevention of negative consequences. The tasks of the State Ecological and Technical Inspectorate are: - state supervision and control over compliance with requirements of regulatory legal acts, technical regulations on mechanical, seismic, fire, environmental, industrial, energy, biological, chemical and radiation safety in relation to products (objects) and / or related processes of production, construction, installation, adjustment, operation, storage, transportation, use, sale, burial, placement and disposal; - supervision of compliance with the labor rights of citizens, as well as labor protection requirements; - fulfillment of obligations under international agreements within the limits of their competence; - interest protection of the state and all participants in civil law land relations in accordance with the current land legislation.

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No	Title of the institution	Task, role of an institution
	Ministry of Economy of the Kyrgyz Republic (Center for Standardization and Metrology (CSM))	The main tasks of the SCM are: - stimulation of scientific and technological progress, - increasing the competitiveness of products, works and services in accordance with the level of development of science, technology and technology, - increasing the level of safety of facilities taking into account the risk of emergencies of natural and anthropogenic nature, - promoting the economical and rational use of resources, - compliance with the requirements of technical regulations, - ensuring technical compatibility, comparability of results and tests, product interchangeability, - increasing the level of life safety, population health, as well as the life and health of animals and plants, individuals and legal entities, state and municipal property, the environment, - Carrying out works on metrology to measure measurements in the Kyrgyz country, - ensuring the conformity of the measurement system to the system of units (SU).
	Ministry of Health of the Kyrgyz Republic	The aim of the Ministry is protection and recruintment the health of citizens in the Kyrgyz Republic. The tasks of the Ministry are the development and implementation of state policy on: - improving the quality and ensuring the availability of the population to health services, - public health, - development of public-private partnerships in health care, - improving budgetary and insurance medicine.
	State Agency for Environmental Protection and Forestry under the Government of the Kyrgyz Republic.	The aim of the Agency is to ensure the preservation of the unique ecological system of the Kyrgyz Republic and the protection of the environment for present and future generations. The tasks of the Agency are: - implementation of policy and regulation in the field of environmental protection and use of natural resources, management of forestry and specially protected natural areas, as well as accounting, assessment of the state of natural components and resources, including forest hunting, - prevention of the impact of possible negative consequences of the implementation of the planned management, economic and other activities on the environment by conducting a state environmental impact assessment, - establishment and development of international cooperation of the Kyrgyz Republic in the field of environmental protection, environmental safety and nature management, forestry and hunting management and a network of specially protected natural areas.

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No	Title of the institution	Task, role of an institution
	State seed inspection	The aim of the Inspectorate is to exercise state control over the varietal and sowing qualities of seed and planting material of agricultural and other crops, including: - varietal - carrying out field inspection of seed crops and plantings, soil control of seed lots, - seed - determination of the sawing qualities of seed and planting material of agricultural and other plants, - documentary - maintaining documents of the established form, registering compliance with technological and other requirements at all stages of the process of production, storage, sale of seeds and planting material. The tasks of the Inspectorate are: - implementation of state control over the varietal and sowing qualities of seeds and planting material of agricultural and other crops, - organization and conduct of field inspection of varietal crops, plantings and hybridization sites in all economic entities, as well as soil control of seed material of agricultural plants, - organization and monitoring of compliance with national and international (ISTA, OESD) standards and rules in the production, storage and sale of seed and planting material of agricultural crops, - organization, planning and methodological guidance of work on standards and norm development for varietal and sowing qualities of seed and planting material.
	Department of Chemicalization and Plant Protection of the Ministry of Agriculture and Melioration	The aim of the Department is to ensure the safe usage of pesticides and agrochemicals, to reduce the losses of agricultural production caused by non-quarantine pests, as well as to increase the productivity of crop production and the quality of plant products. The tasks of the Department are: - implementation in the prescribed manner the regulation of using the pesticides and agrochemicals, plant protection, - prevention of the introduction and spread of especially dangerous non-quarantine harmful organisms, - increasing the knowledge of rural producers in the field of plant protection, preservation and improvement of soil fertility, productivity and quality of agricultural crops.

No	Title of the institution	Task, role of an institution
	Plant Quarantine Department of the Ministry of Agriculture, Food Industry and Melioration	The aim of the Department is to protect the territory of the Kyrgyz Republic from the importation (introduction) and / or spread of quarantine harmful organisms. The tasks of the Department are: - formation and systematic updating of the system of quarantine phytosanitary measures, - prevention of introduction to the territory of the Kyrgyz Republic and / or spread of quarantine harmful organisms on the territory of the Kyrgyz Republic, - prevention of damage from the spread of quarantine harmful organisms, - ensuring the fulfilment of liabilities of the Kyrgyz Republic adopted within the framework of international agreements in the field of quarantine that have entered into force in the manner prescribed by law, where Kyrgyz Republic is taking part.

2.6. SUMMARY – MAIN CONCLUSIONS and RECOMMENDATIONS

The specific of agricultural sector in Kyrgyzstan is agricultural production in small size farms. The main problem is low agrotechnical and economic skills and competence of the new owners and the lack of resources and knowledge for further development. Modernization of study programmes in agricultural universities provide training for knowledgeable and competent students. This would contribute to the production of agricultural products in line with the latest management systems and industry developments in Europe.

For the development of higher agricultural education in Kyrgyzstan aimed at educating knowledgeable young professionals in the content of effective management of the sustainable agri-food production system, the following conclusions can be drawn:

- Much of the education seems to focus on technologies to manage scarcity of constraining factors of production: capital, human capital (knowledge and skills) and environmental resources in sufficient quantity and quality.
- Out-migration of male working-age population causes a shortage of labour, which is a constraining factor of sustainable agriculture, mainly during peak-periods of the agricultural production cycle; lack of labour-intensive activities aiming at environmental sustainability.
- To define exactly knowledge, skills and competencies needs of the agriculture sectors, taking into account the results of the SWOT analysis of the producers.
- To search for new solutions for knowledge transfer between universities and companies in the agricultural sector.
- To develop cooperation with public institutions.
- To carry out dissemination of knowledge in the region with the joined forces of universities and public institutions.
- To implement new solutions as well as the transfer of knowledge between the University and Private Companies is a key element in the development of a given field of production in the region.
- The information, provided in the report, proves that 2 Kyrgyzstan universities have quite different profiles and therefore different needs.
- NSU has a very small number of students in the relevant program; this corresponds to student-teacher ratios that potentially favour learning.
- Study courses should include topics on:

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  - The perception of labour shortage.
  - Management of labour in family farms.
  - Change of rural communities due to out-migration and the repercussions of this on agricultural production.
  - Sources of rural finance.
  - Loan products and insurance products for the farm.
- To integrate the latest scientific findings in study programs, for example on nanotechnologies and biotechnologies.
- To create innovation centers at the university to integrate scientific knowledge in the development of new products. It will ensure collaboration between science and industry and allow students and teachers to improve and develop their scientific skills and competences.
- To broaden the curricula to consider the relationship between the techniques and practices being considered and the context, particularly in terms of sustainability. This could be embedded in a Farming Systems framework and would draw on the relationship of agriculture to social and envornmental sustainability and to a sustainable livelihood framing of farming.
- To increase the volume of practice so that students have more specialization and opportunities to work in various agricultural processing industries.
- To carry out more in-depth risk analysis related to the effectiveness of the implementation of quality management systems.
- To develop cooperation with large companies by organizing student practices in them.
- For the development of quality management systems in agriculture, there are several limitations to their development, among others, to:
  - Cultural aspects (the level of acceptance of certain requirements related to hygiene, social and social practices)
  - Traditional manufacturing practices in primary production and processing
  - Farmers' mentality (readiness to adopt the requirements of the standard) (resignation from traditional production practices) (readiness to submit to control both in terms of production and social practices)
  - The level of infrastructure development on farms
  - Economic aspects (bearing costs for certification is not synonymous with obtaining higher product prices and a guarantee of sale.
- Considering the risk related to the above aspects will allow for a better adjustment of didactic programs and recommendations for beneficiary partners.
- Performing a reliable risk analysis is the basis for effective corrective and preventive actions.
- Based on the experience of implementing quality management systems in EU, it could be unequivocally stated that bottom-up limitations are more difficult to remove than limitations related to the staff and advisory environment.

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3. DETAILED ANALYSIS – UZBEKISTAN

3.1. OVERVIEW OF AGRICULTURE AND AGRO BUSINESS MANAGEMENT RELATED HIGHER EDUCATION OFFER IN THE COUNTRY

Agriculture is one of the dominating sectors of Uzbekistan's economy and and it develops intensively. The last three-four years can be called a period of unprecedented comprehensive reforms in the agricultural sector, including the introduction of market mechanisms, advanced technologies in the agricultural sector and the transition to a cluster production system.

One of the priority directions of the «Strategy of actions for the further development of the Republic of Uzbekistan", adopted at the beginning of 2017, is the modernisation and intensive development of agriculture. On October 23, 2019, the "Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030" was approved. Priority directions for the implementation of the Strategy are implementation of the state policy on food security, providing for food safety and improvement of the consumer intake, production of food products in the required quantity; creation of a favorable agribusiness climate and value added chain, production of agro-food products with high added value competitive on target international markets; introduction of mechanisms to reduce the role of the state and increase the investment attractiveness of the industry; improvement of the system for ensuring the rational use of natural resources and environmental protection; development of modern management systems, providing for the restructuring and further development of the structure of public administration in agriculture; increasing efficiency and a redistribution of government spending; the development of science, education, a system of information and consulting services, providing for the use of effective forms of dissemination of knowledge and information, integrated with production and research, educational and consulting services in agriculture; implementation of programs for the development of rural regions for balanced and sustainable development of rural areas; creation of a transparent system of industry statistics, providing for the introduction of reliable methods for collecting, analyzing and disseminating statistical data through the widespread use of modern information technologies.

Reducing the role of the state and increasing the investment attractiveness of the sector for private investors have become other strategic priorities for the development of agriculture in Uzbekistan. In this regard, it was important to completely abandon government purchases, in addition to the volumes required for the implementation of interventions in cereal crops aimed at ensuring price stability in the domestic market. Measures were implemented aimed at creating food reserves and ensuring macroeconomic stability in the event of a possible threat to the country's food security.

The introduction of market mechanisms into the agricultural sphere, in particular, the system of agricultural clusters, is a priority on the way of deepening reforms at the sector. There are 97 specialized cotton-textile, 149 fruit and vegetable, 65 grain-growing, 35 rice-growing and 7- for the cultivation of medicinal plants clusters in the country, as well as 11 cotton-textile cooperatives. Over the past period of this year, almost 11 thousand, or 90 percent, of the country's farms have been transformed into diversified farms, thereby providing employment for about 37 thousand people. About 6.5 million tons of grain, more than 3 million tons of raw cotton, 21 thousand tons of cocoons, 22 million tons of fruits and vegetables, 2.5 million tons of meat and over 11 million tons of dairy products grown in the country in 2020.

The Government of Uzbekistan developed the Strategy for innovative development of the agricultural education system until 2030. Agricultural higher education is provided at the Tashkent State Agrarian University incl. its branches in Samarkand, Nukus and Termez (TSAU) and Andijan Institute of Agriculture

and technologies (AAI). These HEIs operate under the Ministry of Agriculture of UZB. The Tashkent Institute of Irrigation and Agricultural Mechanization Engineers operates under The Ministry of Higher and secondary education and Samarkand Institute of Veterinary Medicine operates under State Committee of Veterinary and development of animal husbandry. They provide study programmes in agriculture and water issue on the level of Bachelor and Master as well as related post-graduate education (two scientific degrees).

Starting from the 2020–2021 academic year, along with the existing agricultural universities, quotas for admission to bachelor's degrees in agricultural areas were introduced by Gulistan, Bukhara, Karshi, Namangan, Samarkand, Fergana, Urgench state universities. The number students at agricultural higher education increased by 1.3-fold for 2017-2020 years.

According to the Strategy joint educational programs with 30 foreign universities will be organised. It is expected to develop the new programmes applying Bologna process principles. Furthermore, measures will be taken to include universities in the system of agricultural education in the list of 1000 prestigious universities in the world (QS rating system). From the 2020/2021 academic year in all areas of training bachelors and masters, a credit-modular education system will be gradually introduced. To widen the autonomy of higher education institutions and increase accessibility to higher education it is foreseen transformation of Nukus, Termez and Samarkand branches of the Tashkent State Agrarian University into independent institutes.

3.2. HIGHER EDUCATION OFFER AT SAMARKAND BRANCH OF TASHKENT STATE UNIVERSITY OF ECONOMICS

3.2.1. Overview of all curricula related to the main addressed fields of science: agriculture, animal and dairy science, veterinary science, business and management

Type of data	Study years		
	2018/2019	2019/2020	2020/2021
Total number of study programmes **in agriculture science**, inter alias	N/A	6	11
Master level	-	-	-
Bachelor level	-	*6*	*11*
Total number of students in **agriculture science study programmes**, inter alias	-	225	625
Master level	-	-	-
Bachelor level	-	*225*	*625*
Total number of study programmes **in business and management science**, inter alias	-	*4*	*4*
Master level	-	-	-
Bachelor level	-	*4*	*4*
Total number of students in **business and management science study programmes**, inter alias	-	87	216
Master level	-	-	-
Bachelor level	-	*87*	*216*

Number of academic staff members having master or doctor degree, inter alias	-	26	40
In agriculture sciences	-	*4*	*5*
In animal and dairy sciences	-	*1*	*1*
In veterinary sciences	-	-	-
In business sand management sciences	-	*21*	*34*
Number of students' international mobilities		-	-
Number of academic staff international mobilities		2	-

3.2.2. Regulations to be considered while modernization of curricula

The continuity and the linkage among general secondary, specialised secondary, vocational, and higher education are important aspects of higher education quality. As a result of updates and merged areas and specialities, the State Educational Standards (SES) are updated each 5 years. The quality of higher education is assured by the SES which sets the minimum requirements for each educational level, describes the main features, structure, content, and implementation of curricula, ensures the quality control of personnel training, and sets the compulsory (core) components (the list of academic subjects).

The curriculum is defined both at national and institutional levels. According to the Education Act, higher educational establishments can choose their own curricula, textbooks, and methods of teaching. The educational process in higher educational institutions is carried out in line with the State Educational Standards and is regulated by the curricula, academic calendar, and timetables. Curricula is subject to be approved by Ministry of Higher and secondary specialized education of Uzbekistan.

3.2.3. Internal study and curricula quality assurance systems and mechanisms

- *Who is measuring/assessing quality?*
- *Frequency of the assessment?*
- *What are criteria applied?*
- *By whom findings are evaluated?*
- *Who is responsible for corrective measures to be applied?*
- *What are tools to promote quality?*

Prior to the start of the academic year, each teacher in an HEI is required to develop an individual work plan that indicates activities to be performed and outcomes to be achieved during the academic year. The total normative annual workload should be 1,540 hours distributed among five areas: (i) the delivery of training; (ii) the development of training materials;(iii) scientific research;(iv) organization and management activities: and (v) civics and the moral upbringing of students. The main part of the workload is dedicated to teaching, and each category of teaching staff has a recommended distribution of contact teaching hours. On average, professors and associate professors are required to have approximately 20 hours a week of contact teaching, while senior teachers and teachers are required to have approximately 25 contact hours per week. In comparison, most active researchers at US universities teach one course a semester or have only three contact hours per week.

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These individual plans are reported to the Department of Monitoring under the office of the Rector. During the academic year, the implementation of individual faculty plans is monitored by the head of the department. The quality of the lectures is monitored and assessed using open lessons and peer review. The department head also prepares a plan for each faculty member to deliver open lessons with demonstrations of best practices and student research outcomes. Peer reviewers assess these open lessons in terms of their content, methodology, assessment, student performance, and compliance with the SES. Specialists in a particular field may choose to deliver open lessons to their colleagues in the faculty meeting, including the presentation of scientific problems and results of their research.
The reviews of the open lessons are then reviewed by the department head.

One of the main indicators of teacher quality is the scores obtained by the students in the annual assessment. By the end of the academic year, each faculty member is required to prepare a report on the implementation of his or her individual plan. In parallel, the performance of every teacher is assessed through anonymous survey of students. The results of the implementation of annual plans are accumulated in a Teacher Rating System to produce a score for each faculty member. The threshold score of 1,540 determines if a faculty member will be recommended for promotion and a salary supplement or if the faculty members' contract will be terminated.

Besides, academic staff goes for two-month retraining outside of institution (State testing centre) every three years of job (LLP-like obliged by the law). Further, the staff is evaluated in terms of scientific publication activity, open lectures, foreigner language skills, expertise, teaching abroad, internationalisation, and sometimes also survey of students is included (not very often). In general, no evaluation from students is applied. Cumulatively academic staff is evaluated up to 110 points; it can be checked on the electronic portfolio. The final attestation is held in front of the committee – rector, scientific board. The positions /assoc. prof., prof/ are elected by the Academic Council.
The academic staff passes and is awarded with the certificate if has got more than 60 points. In case of failure the teacher is obliged to take retraining again and covers it from own budget. If the failure is repeated, the job contract is terminated.

Systems are based on "hard" and "objective"/quantitative assessment (ratings of teachers, points).

Teacher's assessment (as describe above): (teaching quality assessment and carrier development is repeated regularly, and assessment is linked to salaries and positions, usually does not include student's opinion.

Student's assessment: (tests for entering to study, marks, course of study, tests during study, final/state exams, and employability of graduates, etc.

3.2.4. Collaboration with public sector institutions

Names of main partners and their field/sector of activity	• The Ministry of Agriculture, Ministry of Innovative Development of the Republic of Uzbekistan, • Ministry of Higher and Secondary Specialized Education of the Republic of Uzbekistan, • Supreme Attestation Commission at the Cabinet Ministers of the Republic of Uzbekistan, • Regional Governments, • Samarkand regional government, Ministry of Higher and Secondary Special Education, Tashkent State University of Economics,

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	• Samarkand regional department of statistics; Samarkand regional department of finance
Short description of collaboration	• Approved and funded by the Ministry of Innovative Development of the Republic of Uzbekistan based on proposals on the quota for postgraduate education by higher education and research institutions. The Ministry will announce, and fund fundamental, scientific-practical, and innovative project competitions based on existing problems and priorities. The higher education institutions or scientific organizations participating in the competition will be eligible to implement the project, and the project will carry out the work specified in the deadline. • The Ministry of Higher and secondary specialized education of the Republic of Uzbekistan & the Ministry of agriculture (for agrarian sphere) establishes admission quotas for bachelor's and master's degrees based on the requirements of public organizations and the private sector, as well as the existing material and technical base of higher education institutions. • The Supreme Attestation Commission at the Cabinet of Ministers of the Republic of Uzbekistan, together with the relevant ministries and departments, accepts, reviews, and assigns PhD and DSc degrees to certified dissertations defended by specialized councils for the defence of dissertations. • Regional governments generalize the existing problems in the real sector of the economy and link them with higher and research institutions.
Results, benefits of the collaboration	
Samarkand branch of TSUE won the competition announced by the Ministry of innovative development and is launching a project on Advances in the Internet of Things (IoT) based crop health and soil monitoring with automatic irrigation system. From 2020-2021, 2 PhDs and 1 researcher are funded by the research ministry. 13 students are involved in the factory of innovative ideas in the Samarkand regional administration.	
Vision on how this collaboration can be used for the new curricula development and provision (up to 300 characters)	
The results of the project funded by the Ministry of Innovative Development can be used in the development of curricula and materials for Smart agriculture, Soil science. PhD students and gifted students are planned to be involved in the project-working group.	

3.2.5. Collaboration with industries

Names of main partners and their field/sector of activity	• Samarkand regional head office of the Central Bank of the Republic of Uzbekistan • Sam Antep Carpet Joint Venture • "Afrosiyob parranda" LLC • Jomboy Don Mahsulotlari JSC • Amirkhan nozu nematlari farm (horticulture) • Amir-ul-Bahr Limited Liability Company (footwear production) • Corona Voyage Limited Liability Company (tourism) • Limited Liability Company "Directorate of Software Products and Information Technology Park" (IT-Park) • Samarkand regional branch of the Chamber of Commerce and Industry of the Republic of Uzbekistan (business support organization)
Short description of collaboration	The main directions and spheres of partnerships are the creation of technology parks, foresight centers, transfer technology centers, startups and accelerators in partnership with partners, cooperation with employers, based on the needs of the industry, development of qualification requirements for areas of education and specialties, curricula and higher education programs containing requirements for the knowledge and skills of graduates, training of specialists; the introduction of internships in production for the teaching staff and students; taking into account the programs of the current and prospective development of the relevant industries (spheres) and the region, determination the needs for specialists; conducting qualification practice of students, starting from the 2nd year, in organizations and at partner enterprises, as well as organizing practical classes directly at the production sites for further employment of graduates; the integration between production, science and education to form a foundation of research topics on the problems of scientific and technological development of industries (spheres), and the region. Organization of study visits to enterprises. Allocating space for research.
Results, benefits of the collaboration	
Research results and practical developments were sponsored, and grants were awarded. Curricula are jointly developed.	
Vision on how this collaboration can be used for the new curricula development and provision	
Organization of trainings and practical research, surveys on the solution of existing problems in partner organizations based on the order.	

3.2.6. Detailed information on the curricula to be modernised

3.2.6.1. Curricula and its scope

Data, information required	Information
Title of the study programme	**Agribusiness and investment activities**
Faculty/unit providing the study programme	**Faculty of Economics/Department of Food and Agricultural Economics**

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Credits in national system /credits in ECTS	240 ECTS
Duration of studies (in years)	4 years
Degree or qualification to be obtained	Bachelor of science
Knowledge to be obtained	Methods of conducting and managing business in agricultural enterprises, innovation and innovative activity, their rational use and complex issues related to the organization of production and business processes, production and business, focused on the efficient use of production, labor and financial resources
Skills to be obtained	- organization of business and investment activities in enterprises, organizations, farms of agro-industrial complex, - management of the organization and conduct of agribusiness and investment activities, - development of a work plan for its activities and its implementation, control and evaluation of the results of the work performed, - development of conceptual and theoretical models of solving scientific problems and tasks and implementation of recommendations and developments on the results of research.
Competencies to be obtained	- mastering and implementing the basics of economic theory, management theory, micro and macroeconomics. - modeling, planning and forecasting of economic processes, mastering the basics of economic geography, economic mathematics, econometrics, the organization of research work, - organization and management of agro-consulting services, - coordinated organization and management of agriculture, fruit and vegetable industries, - making management decisions on the application of foreign experience in doing highly effective business using ICT (Internet), - rapid assessment of the effectiveness of the use of new equipment and technologies, management decisions on control, - practical application of managerial, organizational, economic, managerial skills in the field of agriculture, - mastering the mechanisms of foreign economic activity and applying competitive management methods, - knowledge and application of knowledge of customs, metrology, product standardization and certification; participation in the implementation of the food security program, - rapid acquisition of new knowledge in the conditions of modern development of science and technology, the ability to choose the optimal and effective options from a variety of economic solutions, - management of investment activities in agricultural enterprises, development and implementation of business plans, - be able to apply in practice their knowledge and skills in economic, labor, administrative and international law,

	- search for alternatives for the sale of agricultural products using information and communication technologies, especially in foreign markets and the establishment of exports, - organization and management of economic activity in agribusiness, agro-clusters, - to be able to apply in practice the knowledge and skills related to the organization of agribusiness, the organization of livestock production, - have the skills to apply modern management methods in agriculture, - Application of advanced foreign experience in agricultural enterprises, forecasting, economic justification of management decisions.
Whether, after completing the bachelor studies, there is a possibility to continue master level studies? Are there research needs and opportunities in the selected field?	5233300- According to the qualification requirements of the field of education in the field of agribusiness and investment activities, there are opportunities to continue their education in the master's degree after graduation. After the bachelor's degree, the master's degree can be continued for at least two years in the following specialties: - 5A233301- Agribusiness and investment activities, - 5A233101- Accounting in agro-industry, - 5A233201- Agro logistics, -5A230301- Economic theory, - 5A230104- Microeconomics. It can also conduct research based on independent research in the prescribed manner.
Further activities	According to the qualification requirements of the bachelor's degree in agribusiness and investment activities: - There are opportunities to continue education in the master's degree after graduation. - Graduated students can carry out research work based on independent research in the prescribed manner. - After undergoing pedagogical retraining, a bachelor in the field of education can teach special subjects in secondary special, vocational education institutions. - After graduating from the master's degree, the student can stay and work at the university. - Independent work in positions that should be held by persons with higher education in the field of education.
Carrier opportunities per sectors	After graduation, a student can work in the public sector and the private sector, as well as be self-employed on farms. In addition, bachelors in the field of education work in the organizational-managerial, production, technological, research, design-technological and agro-consulting types of professional activities.

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3.2.6.2. Structure of curricula to be modernised

Curricula blocks	Mandatory disciplines (in national credit system and in ECTS)	Optional disciplines (in national credit system and in ECTS)
Basic disciplines for the specialization area	67 ECTS	3 ECTS
Professional disciplines	83 ECTS	4 ECTS
Research and practical work	-	-
Practice	22 ECTS	-
TOTAL	172 ECTS	7 ECTS

Teaching and learning activities	
Activity	Proportion of typical student workload (%)
Lectures	43,3
Reading & self-study	47,5
Watching Media	N.A
Individual assignments	-
Group assignments	-
Laboratory work	0,1
Field visits	-
Other (Please specify)	9,1

Student expected to spend on studying, i.e., on all activities above together 54 hours per week.

3.2.6.3. Existing study and research infrastructures (acquired during the last 10 years and fully functional)

Description
Learning facilities, including distance learning possibilities:
There are 2 Learning facilities in Samarkand branch of TSUE, which uses an optical fiber with a speed of 100 mb / s for the organization of distance learning. For students studying in the distance education system, online lessons are provided through the ZOOM platform, teaching materials are posted on the Moodle platform and HEMIS programs, and conditions are created for distance learning.
Laboratories available for studies:
SBTSUE has 4 laboratory rooms for general subjects, 2 laboratories for technical and special subjects, 2 rooms for course project and graduate work.
Laboratories available for research:
The material and technical base is not enough, laboratory rooms for research are not yet available. From the existing equipment in this grant project, it is planned to establish laboratory rooms for doctoral students to conduct research.
Digital resources available (online conference facilities, Moodle system, distance learning tools, ect)

All classrooms are equipped with computers, classrooms equipped with teaching aids (electronic board, projector, etc.). The buildings are fully covered by WI-FI.

3.2.6.4. Available knowledge sources

Description
Scientific data bases available and used by academic staff and by students
SBTSUE had entered into an agreement with International Scopus Electronic Publishing for staffs and students to use the database. According to it, any employee or student can access this publishing database and use the database via corporate email. Nowadays currently underway with Springer Nature International Electronic Publishing to use the database
Literature directly related to the addressed fields of science (in English, acquired during last 10 years)
For resources in electronic form http://lib.sbtsue.uzsite, which has about 5,000 publications. In recent years Introductory Econometrics for Finance. Cambridge University Press; Macroeconomics Global Edition. Pearson; English for Academics 2. Dubai. Cambridge; English for Academics 1. Poland. Cambridge; Crowing Food F Gude to Food Production. Springer-Verlag New York Inc; Political Ecjonomy of Agricultural and Food Policies. Palgrave Macmillan; Essentials of Economics. South-Western College Publishing; Cost and Management Accounting. Cengage Learning EMEA; Macroeconomics. WordPublishers Inc. English language publications such as US were obtained.

3.2.6.5. Practice during studies

- *Where students go for practice?*

  Agro clusters, High performing local farms, Orchards, Experimental and research instituions, Livestock farms, Provincial agricultural administrations, Crop protection enterprises, Bio-laboratories, regional irrigation associations, Techno-parks, Fertilizer suppliers Cotton Producers, Silk producers, Enterprises for primary processing of frus and vegetables and others. Based on bilateral agreements, student internship even can be carried out in relevant enterprises, institutions, and organizations in foreign countries.

- *Do they search for practice by themselves or there is agreement between HEI and enterprises?*

  Each year, no later than December 1, contracts are signed with businesses and organizations for internships for the next calendar year. Two months prior to the internship, the internship program and calendar schedule are agreed with the practice farms or organizations.

- *How is practice organized and supervised? What are schemes and mechanisms?*

  Qualification internships are carried out based on the Regulation on the practice of students of higher educational institutions of the Republic of Uzbekistan, approved by order of the Ministry of Higher and Secondary Special Education of the Republic of Uzbekistan dated October 30, 1998, No. 305. The basis for sending students to practice is the order of the Director of the University issued by the faculty. The order specifies the list of students who can practice, the farms where they practice, the dates of their conduct, the head and responsible teachers – supervisors. To organize and conduct

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student internships effectively, experienced teachers from the related department are appointed. In addition, the general management of the student's practice is assigned to one of the responsible persons from farm for the internship. Before the internship, a special meeting with students will be held with the Dean of the faculty, the head of the department and the supervisor, who will provide detailed guidance and advice on how to organize, conduct and prepare reports.

- *What is approximate % of students returning to practice companies as specialists after graduation?*

  For the placements farm enterprises are equal partners in the educational process. For successful placements a precondition from this side is, that the farm enterprises have the possibility to offer needed placements, are interested and motivated to offer and are able to transfer practical knowledge to students. Obstacles are the level of development of the farm business, the equipment of farms and the motivation of farmers. The target has to be to establish a trustful, long term oriented cooperation between universities and enterprises . SbTSUE was established on May 27, 2019. That is there are no alumni.

- *Are there any motivation instruments to encourage enterprises to intake students for practice? If yes, describe them!*

  Motivation depends on different factors. One of the factors is, that the effort invested put into relation is not reflected in the benefits received. Therefore the benefits for all participating parties should be clearly accessed and communicated amog them. The placements need to be of mutual benefit to all parties. Weak motivation of scientists may result, among others, from the fact that they do not realize how it can benefit them. Insufficient involvement or low motivation of entrepreneurs may also result from a lack of proper awareness or cold calculation regarding the benefits of student placement. In this regard, universities should consider what can be done to increase the involvement of industry (entrepreneurs, farmers, agriculture-related institutions) in the organization of student placement.

3.2.6.6. Academic staff capacity building measures

Is there an internal capacity building system at the HEI/faculty?

The system of capacity building and rating has been introduced in each faculty of the university. According to it, each professor will be trained once in 3 years. The university has an Institute of Doctoral and Internship Researchers. In order to be eligible for a competition for a position of Head of Department a diploma of Candidate`s degree or Doctorate degree is required; for a position of Professor - a diploma of Doctor of Sciences or the scientific title of Professor; for a position of Associate Professor (Dotcent) - diploma of Candidate`s degree / Doctor of Sciences or the scientific title of Dotcent; for a position as Senior Lecturer or Senior Lecturer or Lecturer - a diploma of higher education (Master / specialist).

The following activities of candidates to the above positions are evaluated by the higher institution (when applicable):

Educational-methodical activity.
Educational activities.
Scientific activity.
Contribution to the development of higher educational institutions.
Personal qualities.

Are there specialized (thematic) and English courses organized at HEI/faculty for academic staff? How often?

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English language courses are organized for professors and teachers, mainly during the holidays.

Is there any motivation system for academic staff increasing capacity on their own initiative and resources?

Not available

3.2.7. SWOT analysis, conclusions, and recommendations

3.2.7.1. SWOT analysis

Strengths	Weaknesses
• SBTSUE is competing to be a leading institution on agribusiness sector of Central part of Uzbekistan • SBTSU have a capacity to implement international experience on agribusiness management • Good capacity building of project team • Very motivated students to utilize know how or outcomes of the project	• Lack of international experience among staff members
Opportunities	**Threats**
• Most agribusiness companies are located in Samarkand • Processing of agricultural commodities, especially food crops is leading sector in Samarkand region • The government is paying attention to science and integration with business area	• Pandemic situation restricts to realization of the strategic plans • Lack of interest of integration of business with academia

3.2.7.2. Conclusions and recommendations

Being a leading institution in the agribusinesses sector of the central part of Uzbekistan and having a motivated teachers' team with international experience on agrobusiness management, the active involvement of SBTSUE in the AgroDev project will considerably contribute to competing to be a leading institution on agribusiness sector of Central part of Uzbekistan. Highly motivated students will utilize the know how provided by the project. Processing of agricultural commodities, especially food crops is leading sector in Samarkand region and a lot of agribusiness companies are in Samarkand. Thi is an advantage, which will boost the impact of the project, e. g. the aimed enhancement of the cooperation between business and universities. The sustainability of the project results can be ensured throught the commitment of the Government to support for the collaboration of science and business.

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3.2.8. Academic staff to be involved in the project (capacity building activities, the new curricula development and its further implementation)

Title (Prof., Dr., MSc., etc)*, degree, name and surname	Field of science	Thematic, subjects in academic work	Field/area in the new curricula
Dr. Shavkat Hasanov	Agriculture Economics	Economic assessment of farm activity	Peasant Economics
Dr. Farhod Ahrorov	Agriculture Economics	Agricultural production economics; Microeconomics	Microeconomics. Macroeconomics
PhD Xonqulov Xusniddin	Agronomy	Fruit and vegetable growing	Horticulture
Dr. Shohista Ishniyazova	chemical sciences	Technology of processing agro products; Techno chemical control of product quality; Agricultural logistics	Technology of processing agro products; Techno chemical control of product quality; Agricultural logistics
Pardayev Husniddin	Management	Agrarian policy and food security	Organic food and its management
Mamasoliev Sodikjon	Agriculture Economics	Innovative activity in agribusiness	Innovation economics in agribusiness
Fazliev Salohiddin	Marketing	Business planning; Agro consulting	Business planning; Agro consulting
Muydinov Olim	Economics	Innovative activity in agribusiness	Innovative activity in agribusiness
Yuldashev Sherzod	Agriculture Economics	Organization and management of agribusiness	Organization and management of agribusiness
Boymurodova Iroda	Economics	Economic theory	Economic theory
Mardonov Mamed	Financial and Management Accounting	Accounting of agricultural enterprises	Management accounting and taxation
Nururllaev Ulugbek	Management	Management in Agriculture	Management in Agriculture

3.2.9. Impact expected with support of the project from perspective of involved HEI

What are your expectations with regard to the impact of new content on students:	
Regarding the knowledge	Enhance of knowledge
Regarding skills	Good skilled with practical implementation of taken knowledge
Regarding competencies	More autonomous decision making of students

What are your expectations with regard to the capacity building measures on academic staff:

Regarding the knowledge	Enhance of knowledge and experiences
Regarding skills	International experience and practical implementation of gained knowledge
Regarding competencies	Higher level competences of decision making

3.3. HIGHER EDUCATION OFFER AT TASHKENT STATE AGRARIAN UNIVERSITY

3.3.1. Overview of all curricula related to the main addressed fields of science: agriculture, animal and dairy science, veterinary science, business and management

Type of data	Study years		
	2018/2019	2019/2020	2020/2021
Total number of study programmes in agriculture science, inter alias	43	43	58
Master level	20	20	25
Bachelor level	23	23	33
Total number of students in agriculture science study programmes, inter alias	5355	5081	5214
Master level	218	306	612
Bachelor level	5137	4775	4602
Total number of study programmes in animal and dairy science, inter alias	1	1	1
Master level	-	-	-
Bachelor level	1	1	1
Total number of students in animal and dairy sciences study programmes, inter alias	242	148	75
Master level	-	-	-
Bachelor level	242	148	75
Total number of study programmes in veterinary science, inter alias	1	1	1
Master level	-	-	-
Bachelor level	1	1	1
Total number of students in veterinary science study programmes, inter alias	218	165	108
Master level	-	-	-
Bachelor level	218	165	108
Total number of study programmes in business and management science, inter alias	2	2	2
Master level	-	-	-
Bachelor level	*2*	*2*	*2*
Total number of students in business and management science study programmes, inter alias	1894	868	522
Master level	-	-	-
Bachelor level	*1894*	*868*	*522*

Number of academic staff members having master or doctor degree, inter alias	549	542	504
In agriculture sciences	*100*	*113*	*268*
In animal and dairy sciences	*16*	*12*	*25*
In veterinary sciences	*4*	*4*	*6*
In business sand management sciences	*34*	*33*	*60*
Number of students' international mobilities	8	11	20
Number of academic staff international mobilities	4	5	6

3.3.2. Regulations to be considered while modernization of curricula

The continuity and the linkage among general secondary, specialised secondary, vocational, and higher education are important aspects of higher education quality. As a result of updates and merged areas and specialities, the State Educational Standards (SES) are updated each 5 years. The quality of higher education is assured by the SES which set the minimum requirements for each educational level, describe the main features, structure, content, and implementation of curricula, ensure the quality control of personnel training, and set the compulsory (core) components (the list of academic subjects).

The curriculum is defined both at national and institutional levels. According to the Education Act, higher educational establishments are allowed to choose their own curricula, textbooks, and methods of teaching. The educational process in higher educational institutions is carried out in line with the State Educational Standards and is regulated by the curricula, academic calendar, and timetables. Curricula is subject to be approved by Ministry of Higher and secondary specialized education of Uzbekistan.

3.3.3. Internal study and curricula quality assurance systems and mechanisms

- *Who is measuring/assessing quality?*
- *Frequency of the assessment?*
- *What are criteria applied?*
- *By whom findings are evaluated?*
- *Who is responsible for corrective measures to be applied?*
- *What are tools to promote quality (..)? …*

Prior to the start of the academic year, each teacher in an HEI is required to develop an individual work plan that indicates activities to be performed and outcomes to be achieved during the academic year. The total normative annual workload should be 1,540 hours distributed among five areas:

1. The delivery of training;
2. The development of training materials;
3. Scientific research;
4. Organization and management activities;
5. Civics and the moral upbringing of students.

The main part of the workload is devoted to teaching, and each category of teaching staff has a recommended distribution of contact teaching hours. On average, professors and associate professors are required to have approximately 20 hours a week of contact teaching, while senior teachers and teachers are required to have approximately 25 contact hours per week. In comparison, most active researchers at US universities teach one course a semester or have only three contact hours per week.

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These individual plans are reported to the Department of Monitoring under the office of the Rector. During the academic year, the implementation of individual faculty plans is monitored by the head of the department. The quality of the lectures is monitored and assessed using open lessons and peer review. The department head also prepares a plan for each faculty member to deliver open lessons with demonstrations of best practices and student research outcomes. Peer reviewers assess these open lessons in terms of their content, methodology, assessment, student performance, and compliance with the SES. Specialists in a particular field may choose to deliver open lessons to their colleagues in the faculty meeting, including the presentation of scientific problems and results of their research.

The reviews of the open lessons are then reviewed by the department head. One of the main indicators of teacher quality is the scores obtained by the students in the annual assessment. By the end of the academic year, each faculty member is required to prepare a report on the implementation of his or her individual plan. In parallel, the performance of every teacher is assessed through anonymous survey of students. The results of the implementation of annual plans are accumulated in a Teacher Rating System to produce a score for each faculty member. The threshold score of 1,540 determines if a faculty member will be recommended for promotion and a salary supplement or if the faculty members' contract will be terminated.

Besides, academic staff goes for two-month retraining outside of institution (State testing centre) every three years of job (LLP-like obliged by the law). Further, the staff is evaluated in terms of scientific publication activity, open lectures, foreigner language skills, expertise, teaching abroad, internationalisation, and sometimes also survey of students is included (not very often). In general, no evaluation by students is applied. Cumulatively academic staff is evaluated up to 110 points; it can be checked on the electronic portfolio. The final attestation is held in front of the committee – rector, scientific board. The positions /assoc. prof., prof/ are elected by the Academic Council.

The academic staff passes and is awarded with the certificate if it has got more than 60 points. In case of failure the teacher is obliged to take retraining again and covers it from own budget. If the failure is repeated, the job contract is terminated.

Systems are based on "hard" and "objective" quantitative assessment (ratings of teachers, points).
Teacher's assessment (as describe above): (teaching quality assessment and carrier development is repeated regularly, and assessment is linked to salaries and positions, usually does not include student's opinion.
Student's assessment: (tests for entering to study, marks, course of study, tests during study, final/state exams, and employability of graduates, etc.)

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3.3.4. Collaboration with public sector institutions

Names of main partners and their field/sector of activity	• The Ministry of Agriculture, Ministry of innovative development of the Republic of Uzbekistan, • Ministry of Higher and secondary specialized education of the Republic of Uzbekistan, • Supreme attestation commission at the cabinet ministers of the Republic of Uzbekistan, • Regional governments, • Samarkand regional government, • Ministry of Higher and Secondary Special Education, • Tashkent State University of Economics, • Samarkand regional department of statistics, • Samarkand regional department of finance.
Short description of collaboration	• Involves public sector in definition of degree paper thematic, elaboration and defending theses (any level) • Educating and training specialists in interest of the sector, represented by partner/-s • Research on demand of the public sector
Results, benefits of the collaboration	
Samarkand branch of TSUE won the competition announced by the Ministry of innovative development and is launching a project on Advances in the Internet of Things (IoT) based crop health and soil monitoring with automatic irrigation system. From 2020-2021, 2 PhDs and 1 researcher are funded by the research ministry. 13 students are involved in the factory of innovative ideas in the Samarkand regional administration.	
Vision on how this collaboration can be used for the new curricula development and provision	
The results of the project funded by the Ministry of innovative development can be used in the development of curricula and materials for Smart agriculture, Soil science. PhD students and gifted students are planned to be involved in the project-working group.	

3.3.5. Collaboration with industries

Names of main partners and their field/sector of activity	• Samarkand regional head office of the Central Bank of the Republic of Uzbekistan • Sam Antep Carpet Joint Venture • "Afrosiyob parranda" LLC • Jomboy Don Mahsulotlari JSC • Amirkhan nozu nematlari farm (horticulture) • Amir-ul-Bahr Limited Liability Company (footwear production) • Corona Voyage Limited Liability Company (tourism) • Limited Liability Company "Directorate of Software Products and Information Technology Park" (IT-Park) • Samarkand regional branch of the Chamber of Commerce and Industry of the Republic of Uzbekistan (business support organization)
Short description of collaboration	• Involves business sector in definition of degree paper thematic, elaboration and defending theses (any level) • Provision of lifelong education for specialists working in business sector • Research on demand or for benefit of the business sector entities • Conduct practice and internship in enterprises • Organises study visits to enterprises Conducting qualification practice of students, starting from the 2nd year, in organizations and partner enterprises, as well as organizing practical classes directly at the production sites for further employment of graduates; the integration between production, science and education to form a foundation of research topics on the problems of scientific and technological development of industries (spheres), and the region.
Results, benefits of the collaboration	
As a result of close cooperation of industrial sector and universities, students-future specialists receive deep knowledge and understanding that correspond to the field of specialization with their application in practice; advanced experience of developed countries; knowledge of the most important legislative documentary acts of the food industry and ability to find the necessary information related to food legislation, the ability to evaluate and analyze labeling. They will have knowledge of the theoretical principles and practical application of the most important instrumental methods of food analysis. Moreover, they have skills of independent conduction of laboratory tests; they can process obtained data and keep records. They will be competent in problem solving, appeared in the production process, competently receive, select, and analyze information and have leadership qualities, creatively solve the implemented tasks and will be able to make decisions on their own.	

3.3.6. Detailed information on the curricula to be modernised

3.3.6.1. Curricula and its scope

Data, information required	Information
Title of the study programme	**Ensuring the quality of agricultural products**
Faculty/unit providing the study programme	**Faculty of storage and processing of agricultural products, Department of standardization and certification of agricultural products**

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Credits in national system /credits in ECTS	240 credits
Duration of studies (in years)	4 years
Degree or qualification to be obtained	Bachelor's degree
Knowledge to be obtained	Agriculture
Skills to be obtained	Ensuring the quality of agricultural products
Competencies to be obtained	Quality control of agricultural products
Whether, after completing the bachelor studies, there is a possibility to continue master level studies? Are there research needs and opportunities in the selected field? If yes, describe them	After completing his / her bachelor's degree, continue his / her master's degree or work in the field.
Further activities	After the master's degree, he can conduct scientific and scientific-pedagogical activities.
Carrier opportunities per sectors	A specialist who has graduated from this field can hold various positions in enterprises specializing in the cultivation, storage and processing of agricultural products, as well as in executive bodies. In the same line, it can operate at the international level by obtaining the necessary licences for operating in the bodies of certificates issuing international certificates.

3.3.6.2. Structure of curricula to be modernised

Curricula blocks	Mandatory disciplines (in national credit system and in ECTS)	Optional disciplines (in national credit system and in ECTS)
Basic disciplines for the specialization area	8 /10	6/10
Professional disciplines	12/10	2/2
Research and practical work	4/4	0/0
Practice	4/4	0/0
TOTAL	28/28	8/12

Teaching and learning activities	
Activity	Proportion of typical student workload (%)
Lectures	*The training is organized according to the plan (the proportion is similar lectures -20 %, practical training -20%, self study- 60)*
Reading & self-study	*Based on pedagogical technologies*
Watching Media	*Based on Information Communication Technologies*
Individual assignments	*In the form of ICT and paper*

Group assignments	*In the form of ICT and paper*
Laboratory work	*in laboratories*
Field visits	*Practice times*
Other (Please specify)	*Mobile lessons, webinars, etc.the G.*

3.3.6.3. Existing study and research infrastructures (acquired during the last 10 years and fully functional)

Description
Learning facilities, including distance learning possibilities:
There are full conditions for distance education. Also, the online platform is constantly maintained. There is an opportunity to establish online standards based on international requirements.
Laboratories available for studies:
outdated
Laboratories available for research:
outdated
Digital resources available (online conference facilities, Moodle system, distance learning tools,etc)
Available and actively used

3.3.6.4. Available knowledge sources

Description	Structural unit of HEI, being responsible for knowledge storage and maintenance
Scientific data bases available and used by academic staff and by students	https://www.coursera.org/programs/tashkent-state-agrarian-university-tsau-9lqmd
IRC, science platforms and Internet resources	-
Literature directly related to the addressed fields of science (in English, acquired during last 10 years)	-
Scientific journals, international conferences, and Internet resources	e.lanbook.com (https://e.lanbook.com/)

3.3.6.5. Practice during studies

- *Where students go for practice?*
- *Do they search for practice by themselves or there is agreement between HEI and enterprises?*
- *How is practice organized and supervised? What are schemes and mechanisms?*
- *What is approximate % of students returning to practice companies as specialists after graduation? Are there any motivation instruments to encourage enterprises to intake students for practice?*

Students study mainly in classrooms at Tashkent State Agrarian University. Classes are organized in traditional, online, remote, and correspondence shales. Students go on acquaintance, production, and technological practices. They go to enterprises that have previously had contracts with the University. Operations are organized centrally and controlled by the educational-style department, where the

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program is conducted accordingly. During the internship, a system of salary payment is also established for students. Active students are encouraged with financial and non-material means.

3.3.6.6. Academic staff capacity building measures

- *Is there an internal capacity building system at the HEI/faculty? If yes, describe, what it includes and how is organized?*
- *Are there specialized (thematic) and English courses organized at HEI/faculty for academic staff? How often?*
- *Is there any motivation system for academic staff increasing capacity on their own initiative and resources?*

Three specialized councils operate continuously in TSAU and prepare scientific personnel in 10 specialties. Therefore, internal capacity is sufficient to increase scientific capacity.

3.3.7. SWOT analysis, conclusions, and recommendations

3.3.7.1. SWOT analysis

Strengths	Weaknesses
• HEI is organized centrally • There is scientific potential • Stability • The demand for knowledge by young generation	• Less independency • No implementation of ECTS system • Limited academic mobility
Opportunities	**Threats**
• Applying ECTS, reaching international level • Developing academic mobility • The support of state	• Global catastrophe (Pandemic, Earthquake)

3.3.7.2. Conclusions and recommendations

The centralized organisation of the university and the strived academic mobility can be advantageous for mainstreaming the project outcomes and achievement of a greater impact. The sustainability of the project results can be ensured throught the commitment of the Government to support for the collaboration of science and business. The demand for knowledge by young generation creates incentives for the academic staff to further build its capacity and improve its competences. Applying ECTS will give TSAU the opportunity to compete at international level.

3.3.8. Academic staff to be involved in the project (capacity building activities, the new curricula development and its further implementation)

Title (Prof., Dr., MSc., etc)*, degree, name and surname	Field of science	Thematic, subjects in academic work	Field/area in the new curricula
Sanjar Adilov	Agriculture Economy.	Agriculture Marketing.	Agriculture Marketing.
Islamov Sahibjon Yaxshibekovich, professor, doctor of agricultural science.	Food technology, Quality management, Storage and processing agricultural products.	Storage and processing agricultural products, processing of livestock's products, sensory evaluation.	Storage and processing agricultural products.
Abduvasikov Abduaziz Abdulazizovich, associate professor, doctor philosophy of economical science.	Food technology, Quality management, Storage and processing agricultural products.	Storage and processing agricultural products, processing of livestock's products, sensory evaluation.	Storage and processing agricultural products.
Odinayev Mirzamad Isayevich, associate professor, doctor philosophy of agricultural science.	Agriculture, standardization and certification.	Standardization and certification of Agricultural Products, Global GAP, ISO, HACCP and so on.	Ensuring the quality of agricultural products.
Umidov Shavkat Ergashevich, associate professor, doctor philosophy of agricultural science.	Food technology, Quality management, Storage and processing agricultural products.	Storage and processing agricultural products, processing of livestock's products, sensory evaluation.	Storage and processing agricultural products.

3.3.9. Impact expected with support of the project from perspective of involved HEI

What are your expectations with regard to the impact of new content on students?	
Regarding the knowledge	Have deep knowledge and understanding in relevant area of specialization with practical application; advanced experience of developed countries
Regarding skills	Have practical skills in using of the most important instrumental methods for analyzing food products, allowing independent conduction of the laboratory tests, process the data obtained, keep records
Regarding competencies	Independently solve problems appeared in the production process, be competent in receiving, selection and analyzing information; have leadership qualities, be creative in task solving, make decisions

What are your expectations with regard to the capacity building measures on academic staff?	
Regarding the knowledge	Improvement of educational standards, curricula and programs of higher educational institutions based on the requirements and advanced foreign experience in the field of agriculture
Regarding skills	Establishment of scientific and production cooperation among the production sector, farms, agricultural clusters and cooperatives with advanced foreign research institutions, the introduction of new scientific developments, innovations, and digital technologies
Regarding competencies	Efficient exchange and transfer of knowledge, qualifications, and skills to students with involvement of workers of production and private sectors

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3.4. AGRICULTURE SECTOR AND ITS KNOWLEDGE NEEDS

3.4.1. Overview of the agriculture sectors

Main produce in crop farming	Main produce in animal farming
· Crops: wheat, corn, barley, oat · Paddy · Legumes: pea, bean · Cotton · Tobacco · Potato · Vegetable · Melons · Fodder crops · Fruits · Grapes	· Meat · Milk · Eggs · Honey · Wool · Leather · Fish

Number of enterprises	2017	2018	2019	2020
Small, inter alias	4 225 564	4 345 687	4 457 348	4 548 927
In crop farming	3 295 940	3 324 451	3 360 840	3 302 521
In animal farming	929 624	1 021 236	1 096 508	1 246 406
Medium	156 547	152 475	77 554	82 416
In crop farming	142 572	134 784	64 875	73 661
In animal farming	13 975	17 691	12 679	8 755
Large	18 457	22 456	25 337	30 746
TOTAL	4 400 568	4 520 618	4 560 239	4 662 089

GDP of the agriculture sector, in EUR	2017	2018	2019	2020
Total GDP for agriculture, EUR	11 607 936 691	14 633 337 655	16 894 856 480	13 579 315 121
% in total country GDP	30.07	27.95	25.52	25.69
GDP per sub-sector (if data available):				
Crops	6 509 109 888	7 688 001 789	7 845 534 702	6 578 627 522
Animal	5 072 535 967	6 858 114 361	8 155 904 949	6 007 165 139
Mixed farming	26 290 836	87 221 505	893 416 829	993 522 460
Support activities to agriculture	289 110 946	35 404 393	x	x

Exports, in % from total production volumes	2017	2018	2019	2020
Total food exports, inter alias	6.3	7.7	8.5	8.8
Crop origin products	5.1	7.2	7.2	8.5
Animal origin products	1.2	0.5	1.3	0.3

Employment	2017	2018	2019	2020
Total employment in crop farming, inter alias	4 941	4 924	4 978	5 478
Employees with higher education	x	x	x	x
Employees with secondary professional education	x	x	x	x

Employees with general education (school level)	x	x	x	x
Total employment in animal farming, inter alias	1 245	1 345	1 263	1 987
Employees with higher education	x	x	x	x
Employees with secondary professional education	x	x	x	x
Employees with general education (school level)	x	x	x	x
TOTAL	6 186	6 269	6 241	7 465

3.4.2. Knowledge, skills, and competence needs of the agriculture sector

The information in this chapter is based on the assessment of questionnaires filled in by companies and/or organisations.

3.4.2.1. Sector's needs of specialists/professionals: required knowledge, skills, competencies

Today, the development of the agricultural sector is associated with the development of processes that process agricultural products, that is, until they are ready for consumption. Unfortunately, the shortage of qualified specialists in the processing industry of agricultural products remains important.

There is a growing need in agriculture for agronomists, plant protection specialists, hydraulic engineers, and food quality assessors. Employers encounter difficulties finding qualified personnel in the above-named fields, as most of young professionals do not meet the requirements of the enterprise, and manufacturers spend extra time and money to retrain them. The main reason for this is that young professionals do not have sufficient knowledge in specific narrow specialties, for example, they have a general understanding of fruit and vegetable processing but do not have sufficient practical skills. In addition, it is necessary to introduce a training system aimed at improving skills and experience in production technology, laboratory technology, wine production technology, bakery technology, grain technology, laboratory analyst, product quality specialist, storage laboratory technicians, mechanical engineers, computer specialists, programmers, etc.

The competitive environment between agricultural producers and processors is developing rapidly. In such conditions, product quality is very important. Nowadays, there is a growing need for experienced professionals who understand the essence and content of organic agriculture, as well as the practical aspects of international marketing relations. This hinders access to international trade with quality indicators. The field of education should be enriched with foreign experience in the training of specialists in the field of agro-logistics.

Young professionals are required to:

- be able of conduct independent laboratory testing,
- be able to process the received data,
- independently solve problems arising in the production process,
- be creative in the task,
- have practical and theoretical knowledge in independent decision-making,
- have advanced experience of developed countries,
- be able to know the most important legislation of the food industry and gather the necessary information,
- be able to analyze the legislation,
- be able to evaluate and analyze markings and skills,
- have information about the country where the products are exported.

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3.4.2.2. Sector's knowledge/ skills/ competence needs related to sustainable management

At present, qualified personnel is partially provided for the introduction of a sustainable management system. Managers of production departments are competent in their fields. Among them there are employees with many years of experience. Therefore, they have developed knowledge and skills in operational management and export-import. Our experts thoroughly study the market for each individual type of products, and regulate the logistics considering the characteristics of our products and carry out their work based on all regulatory documents. Nonetheless, they further need to improve their skills frequently, to increase management efficiency.

The above actions will help them to increase their ability to work in their field, to know the technological processes in production, to be able to make independent decisions, to have leading qualities, to communicate and find solutions in difficult production conditions. At the same time, to compete in the era of globalization, academic staff must have a thorough knowledge of international languages, be aware of the best practices of developed countries, the ability to analyze situations, apply modern information technology in practice, new management methods for quality management systems. We believe that it is necessary to have knowledge and skills, knowledge of waste-free production and digital production technologies, as well as the use of energy-saving technologies.

3.4.2.3. Sector's knowledge/ skills/ competence needs to introduce and maintain digital solutions

Digitization is a new process for companies and enterprises, and our experts do not have a full understanding of it. Some of our experts understand digitalization as the automation of production. Since companies will be able to effectively use digital resources, we plan to further increase the knowledge of our staff to use smart technologies. To achieve this, we set ourselves the task of acquiring knowledge and skills based on the experience of large foreign companies.

The tax policy of the state also plays an important role in the implementation of digital technologies. There are significant financial difficulties in bringing smart technologies from developed countries to our country. The main reasons for this are lack of infrastructure and human resources for the use of smart technologies. If we solve problems quickly and positively, we will be able to automate intelligent management systems and production. This will solve our problems in bringing quality end products to markets.

3.4.3. Overview of the sector-universities relation

3.4.3.1. Current cooperation with universities

The companies have close cooperation with the Samarkand branch TSUE, Samarkand branch of TSAU and Samarkand institute of veterinary medicine in Samarkand. Each company has a branch of the department "Technology of storage, processing of livestock and crop production"; specialists of the company are involved as teachers of this department to conduct laboratory and practical classes in special subjects. Employees of the company participate in the organization of practical training for students. Together with the teaching staff of the university, the company conducts scientific research on dissertations of masters and doctoral students, as well as research work of bachelor students.

Passage of industrial practice according to the season, with the involvement of students in a specific technological process; holding an open day at universities to attract graduates, the benefits, and prospects of working in the company.

Involvement of the company's specialists as teachers for laboratory and practical classes; execution of master's and doctoral dissertations by order of production, with the subsequent introduction of these developments into the production process are important areas of cooperation, which contribute to economic efficiency.

3.4.3.2. Efficiency of higher education – relevance to business needs and development trends

Youth specialists lack deep knowledge, skills of specific technological processes, information technology, language, sociability. The duration of the production practice of narrow specialization in specific industries - agronomy, horticulture, vegetable growing, plant protection and quarantine, storage of crop products, logistics, etc. shall be increased. Instead general education and general professional courses shall be reduced. Specialists from production shall be involved to teach the student to think independently, formulate and analyze tasks and find ways to solve them.

The enterprise can offer as a place for student practice (today we have concluded a joint agreement with Samarkand universities for students to undergo industrial practice). Nowadays, companies meet modern requirements for growing, storage, logistics and sale of fruits and vegetables; logistics centers are equipped with the latest equipment - refrigerators, introduced new varieties of fruits with improved commodity properties, which are in demand on the world market. Highly skilled and competent specialists are willing to share their knowledge, skills and abilities with students for the benefit of the prosperity of our industry.

The desire of enterprises to place orders for universities in horticulture, process analysis managers, technologists is very high. In addition, they support scientific work related to proper storage and loss of storage quality of products, improvement of organoleptic properties - the intensity of coloring of fruits, improving the commercial properties of fruits and vegetables competitive in the world market.

3.4.4. SWOT of agriculture sector, conclusions, and recommendations

3.4.4.1. SWOT analysis

Strengths	Weaknesses
• High share of agricultural production in the country's GDP • Advantageous access to the nearest world markets: Russia, China and Kazakhstan, which has a demand for Uzbek products • Development of clusters in agricultur • Surplus of labor force in local territories • State support for agricultural enterprises introducing innovative technologies: drip irrigation, creation of intensive orchards • State program "Strategy for the development of agriculture of the Republic of Uzbekistan for 2020-2030" providing for increasing the	• Poor technical equipment of laboratories and storage facilities, introduction of advanced technologies, innovations • Low competitiveness of agricultural products • Difficulty in access to the markets for small and medium-agricultural producers. • Insufficient development of the risks system in agriculture • Low level of awareness of agricultural producers on the international standard. • Lack of highly qualified nuclear and radiation safety specialists • Potential decline in land productivity due to the monocultural structure of agriculture

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investment attractiveness of the agri-food sector • Existence of regulatory legal acts to improve lending and ensuaring mechanisms in accordance with the strategic priorities and needs of the agri-food sector • Assistance to the Coordination Center for Information and Advisory Services in the field of environmental methods and techniques, mitigation and adaptation to climate chang • Promotion of the Innovation Education Center to support the development of the agricultural value chain based on international best practices • Provision of advisory services, provision of information on export markets, export readiness, trade regime and trade finance • Supporting diplomatic representatives of the Republic of Uzbekistan in the process of collecting information on target markets and in promoting trade in agri-food products.	• Lack of a mechanism for entering the external market • High costs of transportation and marketing of agri-food products in local and target international markets • Lack of guidance for agricultural producers in following the principles of good agricultural and environmental practice • Insufficient level of guarantee of tenure rights, which restrains the growth of the efficiency of economic management and limits the attraction of investments • Lack of effective mechanisms of interaction and production limits the implementation the results of scientific research funded by organization • Lack of private structures for the dissemination of knowledge and information in agriculture • Use of planning mechanisms and practices used in a centralized economy in the data and information collection system in the agri-food sector • Lack of accurate and reliable data limits the use of new regulations.
Opportunities	**Threats**
• Development of export agriculture • Improving the efficiency of agricultural land use (through know-how transfer) • Organization of breeding reproducers for breeding dairy and beef cattle • Possibility of intensifying production using modern technology and mechanization of manual labor. • Improvement of state veterinary and sanitary inspection, quality control and safety of livestock products • Increasing the investment activity of agricultural enterprises, including at the expense of their own sources, as well as strengthening their financial stability • Training of qualified personne • Creation of jobs through cooperation with enterprises in this project • Favorable natural and climatic conditions • Increasing the share of the cost of the agricultural chain • Diversification of agricultural enterprises • Introduction of new varieties of Food crops	• Threat to food sefety due to the high amounts of agricultural products imports, especially from the CIS countries and China • Instability of the political situation that affects the decrease in investment attractiveness • Frequent changes in legislation • Strict requirements of the main export markets for product and production managemen • Pandemic situation negatively affects the quality of proper farming • Decline in economic growth due to the pandemi • Unfulfilled commitments of clusters and farmers

3.4.4.2. Conclusions and recommendations with regard to the knowledge needs of agriculture sector

The dissemination of knowledge is important for the implementation of science results into practice and includes the training process of agricultural workers of applying modern advanced technologies organic farming (GAP), digital technology, to provide necessary assistance for farmers who do not have sufficient qualifications and work experience. Ensuring close integration of education, science, and production in the field of agriculture will increase the involvement of managers and specialists of dehkan and farm enterprises in obtaining the necessary knowledge, improving leadership skills, and developing business through access and implementation of innovative technologies in agricultural production. Providing retraining and advanced training of personnel, considering the current and future needs of the agricultural sector in qualified specialists, the accelerated introduction of advanced digital and agricultural technologies into the real practice of agricultural production will entail an increase the product quality that meet international food safety standards, an increase in productivity and competitiveness for international market

3.5. POLICY FRAMEWORK and PUBLIC SECTOR BODIES ASSOCIATED to the AGRICULTURE

3.5.1. Policies, measures supporting introduction of good agriculture practice (GAP) and sustainable management

In recent years, in order to develop agriculture in the Republic of Uzbekistan, a number of measures have been taken to ensure the efficient use of resources and increase the quantity and quality of products. This is due to the growing demand for quality and safety of agricultural products on the world market for the export of agricultural products. In this regard, a number of efforts are being made to increase the quantity and quality of agricultural products. Including Organic and Global G.A.P. These include improving the production and safety of products in accordance with the requirements of international standards, the development of regulatory and coordination systems, expanding exports and maximizing the potential of organic production in the country.

There are a number of documents that form the basis for measures to achieve the above objectives. They are:

1. Strategy of agricultural development of the Republic of Uzbekistan for 2020-2030. (Decree of the President of the Republic of Uzbekistan dated October 23, 2019 No. PF-5853, Annex 1).
2. The concept of development of organic agriculture and organic food production in the Republic of Uzbekistan. (Decree of the President of the Republic of Uzbekistan No. PF-5995 of May 18, 2020, Annex 1).

3.5.1.1. National strategies, policies, development programmes already adopted and under implementation:

Type of the document: Strategy

Title: Strategy of agricultural development of the Republic of Uzbekistan for 2020-2030

Period for which the strategy is developed and introduced: 2020-2030

Short description of relation to the GAP or sustainable management:

The development strategy focuses on increasing the export potential of the agricultural sector, increasing the volume of value-added products, the widespread introduction of product certification systems based on

international standards and the development of cooperative relations. Because the lack of an effective system for the dissemination of agricultural knowledge and information in the country, which interconnects the provision of research, education and information and consulting services, is one of the most serious obstacles to the development of the sector on a scientific basis. If we look at the numbers, the current level of public investment in research in this area is 0.2% of the total agricultural budget. This is very rare. The lack of effective mechanisms for the interaction between science and industry significantly limits the implementation of state-funded research results. The yield of local varieties of agricultural crops is low and does not meet the requirements of foreign markets. Dependence on expensive imported varieties of agricultural crops that are not adapted to local conditions is growing. Educational and vocational training courses, educational system, forms, and methods of teaching in educational institutions do not meet modern requirements. It is necessary to create an intersectoral and interagency coordination system to study the requirements of the labour market and the introduction of new specialties.

At present, the country does not have modern private structures for disseminating agricultural knowledge and information. There is a need to create a modern, integrated, and flexible system in the fields of agriculture, food, education, training and information and consulting services. To do this, the document defines several tasks:

- radical reform of the network of research institutions and science;
- reforming the system of education and training of agricultural personnel with the technical assistance of donor organizations;
- audit existing administrative systems to identify strengths and weaknesses of public services and systems for agribusiness, as well as develop plans for restructuring and simplification;
- establishment of a Coordination Centre for information and consulting services on environmentally safe methods and agricultural practices and technologies, mitigation and adaptation to climate change;
- training of special staff for information and consulting centres on agro-technologies;
- establishment of information and consultation centres in all regions of the country on the basis of public-private partnership.

Authority, responsible for implementation: Ministry of Agriculture, "*Uzstandard*" Agency, State Committee for Veterinary and Livestock Development, State Inspectorate for Plant Quarantine, Ministry of Finance, Ministry of Health

Objectives, tasks, relevant to the GAP or sustainable management, aspects:

Objectives: Diversification of production, improvement of land and water relations, creation of a favourable agribusiness environment and high value chain, support for the development of cooperative relations, the widespread introduction of market mechanisms, information, and communication technologies in the industry, as well as scientific achievements effective use and capacity building

Tasks:

- development and implementation of state food security policy, including food security and improvement of consumer rations, production of the required amount of food products,
- convenient implementation of market principles in the purchase and sale of agricultural products, providing for the development of quality control infrastructure, export promotion, production of competitive, high value-added agricultural and food products in target international markets creating an agribusiness environment and value chain,
- introduction of mechanisms to reduce public participation and increase investment attractiveness in the field of modernization, diversification and sustainable growth of the agricultural and food sectors, which will increase the inflow of private investment capital,
- improving the system of rational use of natural resources and environmental protection, including the rational use of land and water resources, forest resources,

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- development of modern management systems, including the restructuring and further development of the structure of public administration in agriculture,
- improving the efficiency and gradual redistribution of public spending through the development of sectorial programs aimed at increasing labour productivity on farms, improving product quality, creating high added value,
- development of a system of science, education, information and consulting services in agriculture, providing for the use of effective forms of knowledge and information dissemination integrated with the production of research, education and consulting services,
- implementation of rural development programs aimed at promoting balanced and sustainable development of rural areas,
- creation of a transparent system of network statistics, which provides for the introduction of reliable methods of collection, analysis and dissemination of statistical data through the widespread introduction of modern information technologies.

Financial instruments adopted for the strategy implementation: Soft loans, subsidies, and other grants

Website: www.lex.uz

Type of the document: Concept

Title: The concept of development of organic agriculture and organic food production in the Republic of Uzbekistan

Period for which the strategy is developed and introduced: 2020-2025

Short description of relation to the GAP or sustainable management:

This concept is aimed at accelerating the following activities in the country:

- official guarantee and increase the volume of production of organic products produced in the country, facilitate the access of producers to foreign markets and expand the geography of exports,
- strengthening the capacity for healthy eating, improving the quality and safety of agricultural and food products, reducing the negative impact on the environment,
- increase of soil fertility and prevention of degradation, preservation of ecosystem biodiversity, ecological stability, strengthening of certification and control systems on the technological scheme "from field to table".
- aimed at expanding research and accelerating the training of qualified specialists.

The concept includes the following areas:
- development of normative and legal documents in the field of technical regulation,
- formation of certification, authorization and accreditation systems,
- training and advanced training of qualified personnel for the production of organic products and raw materials,
- development of domestic markets and expansion of export geography for domestic producers,
- expansion of research in the field of production of organic products and raw materials,
- calculations and reports in the field of organic production,
- integration of organic production systems into international systems.

Authority, responsible for implementation: Ministry of Higher and Secondary Special Education, Ministry of Agriculture, State Committee for Veterinary and Livestock Development, Ministry of Health, Ministry of Innovative Development, State Committee for Ecology and Environmental Protection, *Uzagrokimyohimoya* JSC, *Uzstandard* Agency, Uzbekfoodindustryholding PC , Association of Textile Industry, Council of Farmers, Dehkan Farms and Landowners of Uzbekistan, Council of Ministers of the Republic of Karakalpakstan and regional *khokimiyats.*

Objectives, tasks, relevant to the GAP or sustainable management, aspects:

Objectives: Organic and Global G.A.P. development of systems of production, regulation and coordination of products in accordance with the requirements of international standards, improving the quality and safety of agricultural and forestry products, expanding the geography of exports, as well as increasing the country's full potential for organic production

Tasks:

- official guarantee of organic products and increase production, facilitate access of producers to foreign markets and expand the geography of exports,
- improving the investment attractiveness of agricultural production and the implementation of new investment projects, increasing employment in rural areas,
- strengthening the capacity for healthy eating, improving the quality and safety of agricultural and food products, reducing the negative impact on the environment,
- increase of soil fertility and prevention of degradation, preservation of ecosystem biodiversity, ecological stability, strengthening of certification and control systems on the technological scheme "from field to table",
- aimed at expanding research and accelerating the training of qualified specialists.

Financial instruments adopted for the strategy implementation: Soft loans, subsidies, and other grants

Website: www.lex.uz

3.5.1.2. International agreements, memorandums, and other understandings having impact on national initiatives associated to agriculture and its produce.

No	Title	Year, when the country has signed or joined the initiative	What are the country's obligations/duties	What knowledge is necessary to treat the issue successfully	Who can develop and provide this knowledge at the national level (if there are several stakeholders, name all of them)
1	On cooperation in the development and implementation of Good Agriculture Practice principles in Uzbekistan	2017	To support Uzbekistan's producers to diversify their export markets through implementation of international quality standards	International quality standards	GLOBALG.A.P.

3.5.2. Other public sector stakeholders involved in implementation or monitoring good agriculture practice

No	Title of the institution	Task, role of an institution

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Ministry of Agriculture, Ministry of Higher and Secondary Special Education	Tashkent State Agrarian University cooperates with leading higher and scientific educational institutions in the field of "Growing, storage and processing of organic agricultural products" and attracting qualified specialists from developed countries in organic agriculture, such as Germany, America, France, Israel, Italy, Turkey
Ministry of Agriculture, Council of Farmers, Dehkan Farms and Landowners of Uzbekistan	Introduce the form and procedure for installing signs and indicators on organic land areas
Ministry of Agriculture, Ministry of Innovative Development	Preparation of educational and methodological materials on organic farming
	Carrying out work on popularization of knowledge about the purpose and prospects of organic production
	Preparation of educational and methodological materials on organic farming
	Carrying out work on popularization of knowledge about the purpose and prospects of organic production
	Development of technologies for cultivation of agricultural crops based on the complex use of technological factors and biological means that ensure organic production, plant protection, integrated systems of fertilizers and bio preparations, methods of tillage and crop rotation (field and fodder, vegetables and potatoes)
	Formation of the basis for the organization of organic production in agricultural enterprises, farmers, dehkans and private farms
Uzstandard Agency, Ministry of Agriculture	International accreditation of national certification bodies in the field of organic agriculture
Ministry of Agriculture	Provide training and consulting services to farmers and dehkan farms, entrepreneurs and other stakeholders on organic agriculture and the production and processing of organic food
Ministry of Agriculture, Council of Farmers, Dehkan Farms and Landowners of Uzbekistan, Council of Ministers of the Republic of Karakalpakstan and regional khokimiyats, HK "Uzbekoziqovkatholding", Association of Walnut Growers and Exporters	The State Unitary Enterprise "Center for Standardization in Agriculture" organizes training of specialists of agricultural enterprises on the requirements of organic standards and the provision of consulting services based on economic contracts for the development of the necessary documents in the process of preparation of business entities for organic production and certification
Ministry of Agriculture, Ministry of Investment and Foreign Trade, Council of Farmers, Dehkan Farms and Landowners of Uzbekistan, Council of Ministers of the Republic of Karakalpakstan and regional khokimiyats, HK "Uzbekozikovkatholding", Association of Walnut Growers and Exporters	Expenditures of the State Unitary Enterprise "Center for Standardization in Agriculture" related to the organization of international exhibitions, training seminars and trainings for farms, exporting organizations and other agricultural enterprises implementing the requirements of organic agriculture and good agricultural practices Development of proposals for reimbursement at the expense of the Export Promotion Agency under the Ministry
Davergeodezkadastr Committee, Ministry of Agriculture, State Committee for Ecology and Environmental Protection	Comprehensive assessment of the suitability of agricultural land for the organization of organic production at the regional and local levels
Center for Standardization in Agriculture	Development of general technical regulations on the safety of organic and organic-mineral fertilizers

Uzstandard Agency, Ministry of Agriculture, State Committee for Veterinary and Livestock Development, State Inspectorate for Plant Quarantine	Establishment of national systems of authorization, accreditation and certification in the field of organic production
Ministry of Agriculture, State Committee for Veterinary and Livestock Development, State Inspectorate for Plant Quarantine, Uzstandard Agency	Establishment of a system of assessment and authorization of the equivalence of activities of economic entities engaged in the production, processing, transportation, storage, sale and certification of organic products and raw materials
Ministry of Agriculture, State Committee on Forestry, State Committee for Veterinary and Livestock Development, Uzbekiston Holding HK	Organize the participation of organic agricultural producers from Central Asia and the CIS in IFOAM, exchange of experience in the development of organic agriculture in Central Asia and globally

3.6. SUMMARY – MAIN CONCLUSIONS and RECOMMENDATIONS

The agricultural sector is growing in Uzbekistan and the government is paying attention to diversify agricultural production in the country. New types of farming – clusters, agricultural cooperatives have been established, volume export of agricultural products are growing. The government have issued several legislative acts to support agriculture and agricultural education, e.g., the agricultural strategy of development until 2030 or agrarian education development strategy until 2030, etc. There is also a re-orgnisation of agricultural education and the types of higher education institutions offering it. A science driven and practically oriented strategy is being implemented in agricultural education.

For the modernization of higher education related to agro-industry and effective management of a sustainable system of agri-food production in Uzbekistan, the following conclusions can be drawn:

- The information proves that universities are prepared to effectively implement quality management systems.
- The presented development strategies and centers dealing with technological and organizational consulting allow to hope that the introduction of quality management and food safety subjects at universities will have a positive impact on the development of the consulting sector and the development of formalized quality management systems.
- The actions of the Government are clearly aimed at increasing the role of cooperation between science and industry.
- Lack of specialists and laboratories as the most important element limiting the development of quality management systems.
- The developed program of the project focuses on the improvement of teaching methods and the creation of channels for the exchange of information, experience and the transfer of resources between science and production practice.
- Subjects in the field of quality management and safety of primary production and processing of food products meet the defined problems.
- There is a lot of emphasis on the research skills of staff and on research projects and publishing.
- Co-operation and training on research methods might strengthen the systems supporting the education.
- Student numbers developed quite differently at the Uzbekistan universities.
- Dynamics of student numbers can pose substantial challenges on classroom staff as the teaching methods need to be adapted to the student numbers.

- Harmonization of study programs in accordance with the requirements of the GAP standard.
- Train students as GAP implementation consultants.
- Involve industry specialists in the training process.
- Establish accredited laboratories in universities, where students could learn product testing methods in accordance with the requirements of international standards.
- Set up innovation centres in universities, where cooperation between science and practice could be developed.
- Feasibility of modernizing educational programs related to agri-food production, the use of digital technology and the introduction of quality management.
- Organization of internships in European countries, with developed good agricultural practices and organic farming, to train qualified specialists in the agro-industrial sector.
- Capacity building of academic staff of universities – to organize and conduct joint seminars-trainings, discussions; hold scientific conferences with the involvement of government agencies, departments, and representatives of the agro-industrial sector.
- Improve material resources - it is nessasary to create training laboratory to determine the quality indicators of crop and livestock products.
- Opening of joint programs "Double Degree" between universities of Uzbekistan and Europe.
- To establish links between the higher educational institution and agricultural producers, draw up an action plan:
  - Organization of production practices directly in production by seasons, during sowing, collection, processing with agro-justification.
  - Creation of schools for farmers, at large industrial enterprises, or associations, to teach the practice of NSP and organic farming, with the involvement of specialists from countries with experience in this field.
  - Assisting in the creation of advisory centers for the coordination of regulatory documents with European countries and Uzbekistan.
  - Organization of short-term courses for farmers and dehkan farm workers in European countries with developed NRS.
  - Writing and disseminating methodological guides on the phased cycle of good agricultural practice and organic farming.

4. MAIN CONCLUSIONS, SUGGESTIONS FOR ACTIVITIES AND NEW CONTENT

Given both a rather strong focus of the most programs at the CA partner universities on agricultural production technologies and the profile of EU partners staff involved in AgroDev, the main contributions of

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Linnaeus University (LNU) are in skill building in teaching, supervision, and research methods. Based on the present analysis as well as scoping activities implemented by LNU (online survey, scoping workshop), we suggest three measures for skills development:

1. Online activities related to the use of learning management systems.

The present analysis indicates that Moodle is widely used by the CA universities. At the same time, responses to the online survey suggest that teachers would like to learn more about the scope that learning management systems offer beyond the administration of students and the one-directional dissemination of materials from the teacher to the students. Hence, we suggest a set of online activities that aim at building skills in the use of moodle forums, chats, and quizzes to keep students engaged in synchronous and in asynchronous activities, for instance through discussion groups, peer-review, feedback, and co-production of academic output. We suggest offering this training in autumn 2021 or in spring 2022 through a set of online activities framed by an introductory online meeting with the participants and a joint wrap-up workshop at the end.

2. The production of a video on planning and delivering a laboratory

A critical mass of classes in the programs subject to AgroDev seem to happen in non-standard classrooms including laboratories. Accordingly, several respondents to the online survey would like to have training to develop their skills to teach laboratories. To meet this demand, we suggest producing a short video about planning and teaching a laboratory. The aim of the video is to identify common challenges that teachers of laboratories face and to demonstrate practices how these can be overcome. To meet pursue this aim, the video will include interviews with teachers at CA universities and with colleagues at partner universitites sharing insights how learning in laboratories happens from their perspectives. We suggest producing this by summer 2022. Optional subtitles in English, Russian, Kyrgyz, and Uzbek will allow for wide use that will outlast the project period of AgroDev. An adjunct on this could be a behind-the-scenes film that breaks down how the film was planned and made, as an instruction in media production for education.

3. A training workshop at the LNU in Växjö

Assuming that pandemic-related restrictions to travel will be lifted in 2022, we suggest hosting a training workshop in autumn 2022 at the LNU in Växjö. Responding to the findings from the present analysis and form the scoping exercises, we suggest a set of topics including engaging students in interactive discussions, designing, and implementing problem-based learning, specifying well-defined learning outcomes, and aligning delivery methods of courses and classes to these and adapting delivery methods of classes to varying student numbers.

The main contributions of Latvia University of Life Sciences and Technologies (LLU) are in the field of skills improvement in food testing, food control and food processing methods, innovative food development research methods.

The skills of the academic staff will be improved:

1. In the Institute of Food Safety, Animal Health and Environment “BIOR” (accreditated laboratories; new food testing mehods and equipment; staff scientific research work);

2. In the scientific and training laboratories of LLU (testing and evaluation methods; staff scientific research work);

3. In the veterinary clinic of LLU (the latest treatment methods used in veterinary medicine);

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4. In the food production companies and their laboratories and pilot plants of LLU (innovative food processing methods and equipment; food control methods);

5. In the Centre of innovation of LLU (development of innovative food products; cooperation between scientists and food production companies);

6. In the Food and Veterinary Service (food inspection and monitoring methods).

The activities of the (University of Agriculture in Krakow) UAK team will focus on improving skills in the field of good agricultural practices. Comprehensive implementation of the principles of good agricultural practice should be based on interdisciplinary problem verification.

Realization of the assumptions of GAP will be achieved by designing the curriculum together with the project partners.

An important element will be the preparation of a case study in which the route of GAP implementation will be described on the example of global agricultural certification systems such as Global GAP and Organic Farming.

In connection with the requirements of the presented systems, an important element raised during the preparation of the program will be the issue of natural resource management and waste management, as well as the implementation of quality management systems for this purpose, UAK offers its scientific and technical facilities in the faculty of Agriculture and Economics with Enironmental Chemistry and Soil Science Laboratories as well as laboratories of the faculty of Food Technology.

The complete transfer of knowledge and skills will include a visit of partners from Central Asia at UAK and at the Head Quarters of Producer Groups with the Global GAP system implemented, including Verification of the schemes of implemented Quality management Systems at the headquarters level of the producer group and the farm, the audit and inspection simulation is planned. If such a visit is not possible due to COVID-19, it is planned to conduct a virtual audit and inspection at the headquarters of the producer group and at the farm.

To design properly the study program, it is necessary to transfer the ready-made and functioning GAP implementation schemes to the curriculum with an emphasis on creating the possibility of conducting practical classes in the field with case studies on the farm or in the enterprise.

Another important element is addressing the problem of research methodology, this problem is directly related to the transfer of knowledge between the university and the enterprise, an appropriate approach to the methodology of process research will allow for the establishment of closer ties between the University and the entrepreneur, the team of UAK will conduct seminars on research methodology in agricultural sciences in the context of the implementation of the curriculum and cooperation with the entrepreneur.

5. ANNEXES

No 1 CVs of academic staff (template)

<table>
<tr><td>Name and surname:</td><td></td></tr>
<tr><td>University:</td><td></td></tr>
<tr><td>Year of birth:</td><td></td></tr>
<tr><td>Education, field of science:</td><td></td></tr>
<tr><td>Experience in university:</td><td></td></tr>
<tr><td>Other work experience (if there is any relevant besides work at HEI):</td><td></td></tr>
<tr><td>Core academic and research areas:</td><td></td></tr>
<tr><td>Research activities and main achievements (up to 1500 characters):</td><td></td></tr>
<tr><td>The most significant and relevant publications during last 5 years period:</td><td></td></tr>
<tr><td>International academic experience:</td><td></td></tr>
<tr><td>International research experience:</td><td></td></tr>
<tr><td>Languages and their knowledge level:</td><td>Indicate knowledge on a scale of 1 to 5 (1- excellent; 5- basic)
<table>
<tr><th>Language</th><th>Reading</th><th>Speaking</th><th>Writing</th></tr>
<tr><td>Uzbek /Kyrgyz</td><td colspan="3">Mother tongue</td></tr>
<tr><td>English</td><td>3</td><td>5</td><td>4</td></tr>
<tr><td>Russian</td><td>5</td><td>2</td><td>4</td></tr>
<tr><td>…</td><td></td><td></td><td></td></tr>
</table></td></tr>
<tr><td>Digital skills:</td><td>Indicate skills: proficient – average- basic level
• Information processing - basic
• Use of online based communication tools- average
• Content creation, using computer - average
• Storage and downloading materials in internet document storages- proficient
• Safety, problem solving- basic</td></tr>
</table>

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No 2 Questionnaire – agriculture sectors knowledge needs from the point of view of acting enterprises (template)

Name of a company/organisation	
Year of establishment	
Number of employees (for enterprise)	
Number of member organisations	
Area	Crop farming / animal farming / …

What kind of specialists/professionals your sector/company needs? What professional (product and/or technology related) knowledge, skills, competencies they must have?
Up to 2000 characters.

What is sector/company knowledge/ skills/ competence needs related to the companies and their department sustainable management?
Up to 2000 characters.

What is sector/company knowledge/ skills/ competence needs to introduce and maintain digital solutions?
Up to 2000 characters.

What trends should be observed while developing higher education content in order to strengthen sector/company?
Up to 2000 characters.

What improvements you would suggest in order to develop and strengthen cooperation among sector and universities?
No limits.

Do you offer and provide your enterprise as practice place for students? Please, justify why yes or why not! In what conditions you would offer your company for practice?
No limits.

What improvements you would suggest in order to improve relevance of higher education to needs of your sector?
No limits.

What international production standards your company has implemented or is going to implement? What challenges you have faced in this process?
No limits.

Thank you for your participation!

Name and Surname:
E-mail:
Telephone: