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REPORT
ON THE ASSESSMENT OF THE SITUATION IN AREA OF HIGHER EDUCATION, FOOD PRODUCTION AND PROCESSING IN RELATION TO FOOD QUALITY AND SAFETY IN TAJIKISTAN AND KYRGYZSTAN (D1.1)

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INTRODUCTION

One of the primary goals for the governments of the region (Kyrgyzstan and Tajikistan) is to integrate their countries into the global economy. Understanding the importance of exports diversification and search for new markets, which is an issue of paramount importance for the countries of the region, the government agencies are focusing on developing market diversification activities.

Entering developed global markets requires meeting the conditions and requirements of a number of universally accepted international standards ensuring food safety for consumers. Some of these international standards include food safety standard Global GAP (Good Agricultural Practice) for producers (farmers), and HACCP (Hazard Analysis and Critical Control Points) for processors of fresh fruit and vegetable products.

These standards, in particular, focus on ensuring food safety when exporting goods to developed countries. All countries of the region can act as suppliers/exporters of certified products to the markets in developed countries if they meet the standards. Introducing and following the rules and requirements of the aforementioned standards with subsequent certification will eventually give competitive advantage to the region's exporters. A more efficient and promising access to new export markets is also possible if all Central Asian actors (Universities, governments, producers/exporters) operate in a joint and coordinated manner.

The region has a great potential with regards to production of diverse and affordable agricultural produce; however, implementing the food safety standards is a challenging issue. In particular, there is an acute shortage of specialists capable of implementing these standards at production and processing SMEs of the region.

Republic of Tajikistan

In early December 2016, the Parliament of Tajikistan passed a document titled "National Development Strategy for up to 2030", which shall be ratified by the President in the next few days. The Strategy provides for a gradual transition from one type of development to another as the measures are being implemented.

Systemic and consistent application of the NDS-2030 target will be ensured through implementation of mid-term development programs, each developed for a five-year period. The first one, "Mid-Term Development Program of the Republic of Tajikistan for 2016-2020", has recently been adopted by the Parliament and will be ratified by the President shortly.

Indicative planning, set as the basis for the Mid-term Development Program (MDP) 2016-2020, aims to introduce systemic and conceptual changes to the national legal environment, which are aimed at ensuring national security and improving the quality of economic development. A number of objectives need to be met to achieve this goal, including establishment of sustainable high economic growth rate and its new quality based on accelerated development of professional skills, knowledge and technology; modernization and diversification of economic activities; building a dynamic national and local governance system; reducing vulnerability to external factors.

Nevertheless, the country's Government today still follows the main directive outlined in the National Development Strategy for up to 2015, which states: "Developing various sectors supporting economic growth in Tajikistan will result in establishment of the basis for stable growth of the country's economy, thus resulting in a decrease of the overall poverty rate". At the same time, development of the agribusiness industry, manufacturing, energy and infrastructure sector will provide for higher domestic employment, diversification of exports, increase availability and quality of government service and related (water supply, sanitation, healthcare, social protection, environment) social services for the population, which is directly linked to the implementation of all MDG (Millennium Development Goals) in Tajikistan. Industrial production dropped sharply in post-market period, and

despite the recent growth, has only reached 63.6% of the 1991 level in 2004. Some industries, however, lag far behind, with production of whole-milk products being just 7.2%, animal fat – 1.6%, refrigerators – 6.3%, and footwear – just 0.8% of the Soviet level. Agricultural production, accounting for 21% of GDP, is also used as inputs for industry (mainly primary processing). With about one third of the country's population living in rural areas, many of them are forced to go to other countries as labor migrants.

Tajikistan entered the transition period with relatively highly educated human resources and an extensive network of educational institutions inherited from the Soviet system, which resulted in a high aggregate coverage of general secondary education and gender equality. Preserving the achievements in education and their further development given the new political, social and economic conditions, strengthening independence while rebuilding national history and culture, traditions and customs of the ancient Tajik nation combined with development on a global scale and universal human values became an important issue in the transition period. Addressing these problems was seriously aggravated by aftermath of a destructive civil war.

The National Education Development Strategy for 2006-2015 was developed in 2005, with the aim of addressing MDT (Millennium Development Goal) and EFA (Education For All) goals and objectives. Achieving the MDT and EFE goals is impossible without a radical reform of the education system, taking into account its problems.

The quality of education and upbringing, knowledge and skills level among schoolchildren and University students are far behind the call of time. Until now, no scientifically proven curricula and training programs have been developed for all levels of education, meeting the needs of the national economy. Absence of modern textbooks, study manuals, scientific and methodological materials complicates the situation with conducting the studies and absorption of the study subjects.

Educational institutions lack modern electronic technologies, computers and Internet access, and the use of those available is complicated due to absence of specialists and frequent blackouts in winter. The concept for developing and involving private sector in education, particularly in pre-school and higher vocational education, has not been developed.

Some goals and priorities are determined by the desire to achieve the main target. This includes two goals that have a positive effect on the implementation of this project:

1. Assisting economic growth;
2. Developing the education system.

Development of human resources, which represent an important factor in the development of production and the economy in general, is set as a priority direction in the activity of the Government of the Republic of Tajikistan. For example, NDS 2030 declares the importance of linking the education system with the labor market, creating a balance between supply of specialists at different levels and demand of the labor market. Development of industry-specific reskilling programs will allow preparing the people to working in top-priority professions.

Food industry occupies the second biggest share in the gross industry output of this country. This includes growing, collecting fruit and vegetable and processing inside the country, including grain crops and production of agricultural produce.

Improving the quality and safety of food products is a priority direction in the National Development Strategy (NDS) of Tajikistan. To achieve the goal of ensuring quality and safety of food products, it is obviously necessary to train skilled specialists in the area of food industry, build the capacity for prosperity and develop the quality management processes in the production and processing of food produce. Additionally, food safety requires building adequate control over the entire food production chain, from growing at the farm to getting to the consumer's table, "from farm to fork"; it is also important to develop and implement new products and technologies. The latest data available does not reflect the actual picture with the production and processing of food products, particularly the

availability of sufficiently skilled specialists I this area. It should be noted that the Government does admit the obvious shortage of highly qualified specialists in food industry.

Naturally, education is a strong tool for improving human resources capacity and providing experienced specialists to the industry. Universities, with their state-run education programs and high academic capacity, play a major role in producing the kind of specialists the country's food industry requires. With this in mind, the Government has highlighted capacity-building in education as one of the top priorities in the country's development, mainly focusing on capacity-building of teaching and academic staff and reviewing and optimizing the content of study curricula. These objectives are also present in the National Education Development Start of the Republic of Tajikistan for 2006-2015, which formulates Strategic Goal No.3 as ensuring the quality of education services provided at all levels and updating them in accordance with the global initiative "Education for All" and Millennium Development Goals. To achieve these goals, a number of long-term activities are planned, some of which will be implemented as part of this project. These go as follows:

1) Updating study curricula;
2) Providing additional training to teaching staff;
3) Introducing new methodologies in the education process;
4) Monitoring and evaluation of the quality of education and academic performance.

Developing and implementing a cross-disciplinary approach "from farm to fork" in the Agricultural Development Strategy is an innovative method for Tajikistan, which until recently had no master's level programs that would unite and tie together various disciplines. For example, a study of the programs available to the students in professions related to food quality and safety issues has shown that the subjects are taught as standalone disciplines, with no connection between them. Students studied topics without identifying any connections between various disciplines. Developing and implementing a cross-disciplinary master's level training program with the specialization in "Food Quality and Safety Management Technology" covers the full range of issues faced at all stages in the production and processing chain for food products. This program will assist the training of highly qualified specialists, improving the capacity of the students, helping them acquire knowledge and skills meeting the EU education standards, which ultimately will promote and improve the competitiveness of Tajikistan's food industry in general. Designing and approving a high-quality master plan for quality management will help improve the quality of education and introduce a monitoring culture in Tajikistan, which is underdeveloped now. The entire study process, its products and outcomes, will be closely monitored and all decisions on further development of the program will be based on the facts studied. In the long run, this will enable a cultural shift that will form the grounds for strengthening organizational structure.

Republic of Kyrgyzstan

The government of Kyrgyzstan stated in the National Strategy for Sustainable Development of the Republic of Kyrgyzstan for 2013-2017: "The existence of a strategic vision of the country's future will help implement projects and plans as part of mid-term programs, that will facilitate meeting the country's long-term development goals. Synchronizing the mid-term programs with long-term goals will enable sustainable development of Kyrgyz Republic and successful integration of the country into the global economy.

A substantial part of the Strategy deals with agricultural issues. Kyrgyzstan must not only ensure its food security; it also has to win back the status of a major supplier of eco-friendly agricultural produce and processed products to the foreign markets, meeting international standards and requirements.

The agricultural sector has been and remains one of the top priorities in economic development of Kyrgyzstan, in terms of its contribution to the national economy, supplying inputs to the industry and food to the consumers, as well as employing a major part of the population.

Trade barriers affect the growth of food production, obstructing Kyrgyz producers' access to cross-border markets. Another issue affecting the growth of exports is the low quality of domestic agricultural produce and processed products. The situation is further complicated by underdeveloped

quality control and certification system for agricultural produce in accordance with international requirements and standards.

Kyrgyzstan's membership in Eurasian Economic Union (along with Belarus, Kazakhstan and Russia) is a major challenge for the local agricultural sector. Other member states being much larger than Kyrgyzstan in sheer economy size, they are able to offer huge financial support to their agricultural sector. This will invariably result in the need to adapt Kyrgyz agriculture to the new conditions, including changes in the structure of agricultural production and its orientation to producing competitive products meeting the EEU requirements. EEU unified requirements in the area of food safety are established by mandatory regulatory documents (Technical Regulations of the Customs Union, or TR CU). According to TR CU 021/2011, Article 10 "Ensuring safety of food products in the process of production (manufacturing), storage, transportation and sales" states that when performing the processes related to production (manufacturing) related to safety of food products, the producer must develop, implement and maintain procedures based on HACCP principles. Therefore, it is important to train specialists for food industry today, specifically for food safety management.

The National Strategy outlines the issues related to the reform of the education and science system. An analysis of the current state of the education system in Kyrgyz Republic shows numerous issues obstructing the progress towards a better-quality education. The current situation is characterized by the education system lagging behind not just global demands but also the needs of the Kyrgyz society. So the answer to this challenge can only be associated with reforms of the education system.

About 1.5 million Kyrgyz residents are studying or working in the education sector. The most important step in the reform of the education system is the adoption of the Education Development Strategy for 2012-2020. Its idea is to build a flexible, open, modern national education system while taking into account the best traditions of Soviet education system and international experience. The reform is based on the idea that the education system must support competitiveness and economic prosperity of the country while improving the value and quality of human resources.

The higher education system must ideally be based on market principles, using the government orders mechanism. This mechanism would be based on studies identifying the current state of the market and the education system, while tracking the trends in the development of economic and other areas of life for adequate reaction and modification of the education system considering the country's development.

To achieve the goals established, a number of long-term activities are planned, some of which will be implemented as part of this project. These go as follows:

1) Updating study curricula;
2) Providing additional training to teaching staff;
3) Introducing new methodologies in the education process;
4) Monitoring and evaluation of the quality of education and academic performance.

1. ANALYSIS OF THE SITUATION IN TAJIKISTAN

1.1. ANALYSIS OF THE HIGHER EDUCATION SYSTEM IN THE AREA OF SAFETY AND QUALITY OF FOOD PRODUCTS

1.1.1. Legislation related to the management and regulation of higher education system, designing and implementing study curricula and their support

Document name	Relation to the project (what needs to be considered when designing and implementing the national development strategies)	In English and/or Russian
The Law of the Republic of Tajikistan "On Education" No.1004 of 22 July 2013	Articles: 1. State education standards and programs 2. Operating procedures for educational institutions 3. Charters of educational institutions 4. Higher vocational education 5. Academic certificates 6. Competencies of the national public education governance bodies in the Republic of Tajikistan	Russian
The Law of the Republic of Tajikistan "On Higher and Post-Graduate Vocational Education" No.531 of 19 May 2009	Articles: 1. State education standards and programs for higher and post-graduate vocational education. 2. The level of higher vocational education, its forms and durations 3. Educational, methodological and academic activities at higher learning institutions	Russian
Decree of the Government of the Republic of Tajikistan No.118 of 3 May 2011 "On approving the type regulation on educational institutions of higher vocational education in the Republic of Tajikistan"	1. Enrollment and education at Universities 2. Implementation of the state standards for higher pedagogical education at the Bachelor, Master and Specialist degree level	Russian
Decree of the Government of the Republic of Tajikistan No.552 of 02 November 2011 "On approving the state standard for higher vocational education in the Republic of Tajikistan"	1. The structure of higher vocational education. Academic certificates confirming higher education. 2. Key academic programs for training human resources at Bachelor, Master and Specialist degree level	Russian
Decree of the Government of the Republic of Tajikistan No.264 of 1 August 2005 "On approving the type regulation on educational institutions of higher vocational education in the Republic of Tajikistan	This is the cornerstone document governing the activity of the Tajik Agrarian University, as it determines the process of education, re-training and career advancement courses for employees with higher vocational education and highly skilled academic and teaching staff. TAU has the status of a University and, subject to Ministry of Education and Science approval, can establish colleges, branches, academic and methodological institutions, training and experimental farms, technological parks, faculties, chairs, preparatory training departments, research and development and planning institutions, Master's degree training programs, post-graduate programs,	Russian

	Doctor's degree programs, additional vocational training courses, library, clinics, accounting training centers, design bureaus, experimental stations, methodological and information centers, technology and innovation centers, production and other structural units. It also has a number of other privileges according to this regulation.	
Decree of the Government of the Republic of Tajikistan No.200 of 3 May 2002 "On approving the National Education Concept of the Republic of Tajikistan"	A concept of vocational education development in the Republic of Tajikistan, based on the Constitution, the Law on Education, the Law on Higher Post-graduate Vocational Education, instructions and decrees by the President of Tajikistan (as voiced at the meeting with the education workers on December 22, 2005), and other regulatory documents related to education. The Concept determines the structure of vocational education in Tajikistan, which consists of three stages: primary vocational education, secondary vocational education and higher vocational education. The Concept reflects the trend in the government's efforts to develop higher vocational education given the new public paradigm and the development of a common global educational space.	Russian
Decree of the Government of the Republic of Tajikistan No.484 of 1 November 2006 "On the Concept for Development of Vocational Education in the Republic of Tajikistan"	The Concept has been developed for the current level of social development and reform of the global education system. It is intended to develop economic, social and cultural life. The goal of the Concept it to meet the ever-increasing demand of the labor market for skilled specialists and determines the content, goals and objectives of the secondary and higher vocational education system.	Russian
Decree of the Government of the Republic of Tajikistan No.529 of 2 November 2007 "On State Program for Development of Vocational Education in the Republic of Tajikistan for 2008-2015"	The Concept is developed on the basis of regulatory documents, national and universally accepted human values, recovery of the historical self-identification, national mentality and traditions, scientific achievements, etc. It enables supporting the reform of the secondary and higher vocational education and the state guarantee of the people's right for education. The Concept ensures provision of high-quality education to people regardless of their ethnic, racial, religious, gender and language background. The Concept covers the prospects of the medium and higher vocational education reform and demands that all ministries, departments, government agencies and residents of the country follow it.	Russian

1.1.2. Universities offering programs related to food quality and safety management

Tajik Agrarian University (TAU) was established in 1931. In 1934 it was renamed to Tajik Agricultural University. In 1992 (by resolution of the Council of Ministers of Tajikistan No.311 of 10 August 1992), the Institute was renamed back to Tajik Agrarian University. It is currently training 8132 students, including 6331 intramural and 1801 extramural. TAU operates 9 faculties: agronomy, agribusiness, animal engineering, veterinary, economic, gardening and agricultural biotechnology, agricultural machinery and melioration, which train highly-skilled human resources in 43 professions. TAU also operates **Biotechnology Research Institute**, specializing in reproduction of virus-free seed potatoes and some species of coniferous trees, as well as two science and production farms (Ghissar

and Yavan-1) with more than 1200 hectares of land. The 515 teaching staff are engaged in the educational process, including 6 Academicians, 5 Corresponding Members of the Academy of Science of the Republic of Tajikistan, 58 Doctors of Sciences, 68 Professors, 142 Candidates of Sciences, working at the 51 chairs of the University. TAU is currently training Masters in 33 specializations, post-graduate and external doctorate students in 24 specializations, and doctorate students in 8 specializations. TAU has 12 academic buildings with more than 200 classrooms, 25 research labs, 15 computer centers, and a library with more than 370,000 science and educational titles. Recently TAU established analytical, educational and methodological departments. TAU closely cooperates with 93 higher learning institutions from 26 countries: Germany, Netherlands, Japan, Israel, USA, Iran, Sweden, Latvia, Lithuania, Slovakia, China, Poland, Italy, Russia, Belarus, Kazakhstan, Kyrgyzstan, Armenia, Korea, etc. TAU is currently implementing 18 projects under various international programs.

Khujand Polytechnic Institute of Tajik Technical University (named after Academician S. Osimi) (KPITTU) was established in 2010 after the merger of two educational institutions – Branch of the Technical University of Tajikistan (named after Academician S. Osimi) and Khujand Branch of Technological University of Tajikistan.

The academic semester at KPITTU consists of 19 weeks, with classes taking place in cycles.

Semester structure at KPITTU			
19 weeks			
Cycle 1	Cycle 2	Cycle 4	Cycle 5
Cycle 3 (Friday classes)			

Each cycle consists of 22 business days – 16 days of classes, the rest are for examinations or individual work. A single discipline of six credits is taught in each cycle (rarely two disciplines of 3 credits each, or two disciplines of 4 and 2 credits). One credit equals 24 academic hours of 50 minutes each.

The credits do not include the time used to take exams, so each credit can be considered to represent 28.5 academic hours. The academic hours for a discipline worth six credits are usually distributed as follows: 6 credits = 144 hours, including 64 hours of classes, 32 hours of consultations, 48 hours of individual work.

The project will introduce new disciplines and change the content of the disciplines for three specializations at KPITTU:
Direction "4901 FOOD PRODUCTION" (49 – FOOD INDUSTRY):

1) **490101 – Plant materials processing and storage technology**
2) **490102 – Animal materials processing and storage technology**

Direction "7402 PRODUCTION, STORAGE AND PROCESSING OF PLANT PRODUCTS" (74 – AGRICULTURE):

3) **740206 – Production, storage and processing of plant products**

Under the current classifier of specializations in higher vocational education in the Republic of Tajikistan, the codes and titles of bachelor's and master's degree specializations are **the same**.

The structure of all 19 specializations of the KPITTU Bachelor's degree program is the same, as presented in the table below:

Structure of bachelor's degree study plan		
Discipline blocks	**Number of credits**	
	Mandatory disciplines	Optional disciplines
Humanities	51	3
Natural sciences	15	3
Total	72	
General professional disciplines	54	18
Total	72	
Professional	36	36
Total	72	
Out-of-class activities	24	
Total	240	

Of the 240 credits in the study program, 216 represent academic disciplines in four blocks – humanities, natural sciences, general professional and professional disciplines. 24 credits are allocated to practical activities, apprenticeships, and bachelor's thesis work.
The Ministry of Education and Science has defined the list of disciplines and their content, which are mandatory for all bachelor's degree specializations, with the total amount of 72 credits. The new edition of bachelor's degree study programs at KPITTU has been approved by the Ministry of Education and Science of the Republic of Tajikistan in April 2016. First-year students enrolled in 2016 are currently studying under the new curriculum, while students at their 2nd to 4th year are still studying under curricula approved in 2011.

The structure of all 16 specializations of the KPITTU Master's degree program is the same, as presented in the table below:

Structure of master's degree study plan		
Curriculum blocks	**Number of credits**	
	Mandatory disciplines	Optional disciplines
Basic disciplines for the specialization area	12	12
Professional disciplines	24	12
Research and practical work	60	
Total	120	

The current edition of master's degree study programs at KPITTU has been approved by the Ministry of Education and Science of the Republic of Tajikistan in October 2015. First-year students enrolled in 2016 are currently studying under the new curriculum, while students at their 2nd to 4th year are still studying under curricula approved in 2012.

1.1.3. Existing study programs (at all levels)

Study programs for bachelor's and master's degree level, related to food production technology (particularly food quality and safety), including veterinarian science, related to food safety.

Tajik Agrarian University

Study program name (TAU)	*490101 – Fruit and vegetable storage and processing technology*
Area	**Food production**
Content	The curriculum content is aimed at teaching professional activities in the area of storage and processing of fruit and vegetables for food industry enterprises. The students learn the basics of storage, quality estimation for fruit and vegetables, storage conditions and rules for fruit and vegetables, scientific storage methods for food products, physiological, biochemical and microbiological processes occurring in storage, fruit and vegetables as objects of storage, their properties; basics of processing fruit and vegetables, classification of storage methods, canning methods, drying fruit and vegetables, sanitation in production, etc. The curriculum includes training plan, standards, subjects and other materials ensuring the quality of training, as well as programs for educational and production internships, calendar of classes and study materials ensuring the compliance with the respective educational technology.
Methodology of implementation (duration, training, study modules, etc.)	The training duration for the bachelor's degree program with the specialization "Storage and processing technology for fruit and vegetables" is four years, or 240 credits. Students study special disciplines, such as: technical microbiology with the basics of winemaking, buildings and equipment, storage and processing technology for vegetables and potatoes, product quality management and standardization, basics of commodity science, storage and processing technology for fruit and berries, storage and processing technology for technical crops, technical and chemical production control, canning and drying fruit and vegetables, biochemistry of fruit and vegetables, scientific and theoretical basics of storage and processing technology for agricultural products, production technology of fruit and vegetable juices, food additives, metrology, standardization and certification, HACCP standards, processes and machinery for food production, and other disciplines related to production, storage and safety of food products.
How program quality is ensured	The quality of training program is ensured by conducting lectures and practical classwork. To back theoretical knowledge with practice, the students also complete apprenticeships at production enterprises and the University's research farms. The University has an Education Quality Management Department, which regularly performs internal quality control activities based on the strategy of constantly improving the quality of educational programs. It also monitors the students' academic progress.
Study program name (TAU)	*740206-2501 – Agricultural produce storage and processing technology/economist*
Area	**Food production**
Content	The curriculum content is aimed at teaching professional activities in the area of storage and processing of agricultural

	products, and agricultural economics. The students learn the basics of storage, quality estimation for agricultural products, storage conditions and rules for agricultural products, scientific storage methods for agricultural products, physiological, biochemical and microbiological processes occurring in storage, agricultural products as objects of storage, their properties; basics of processing agricultural products, classification of storage methods, canning methods, drying fruit and vegetables, sanitation in production, agricultural economics, management, agricultural production organization, using food additives, etc. The curriculum includes training plan, standards, subjects and other materials ensuring the quality of training, as well as programs for educational and production internships, calendar of classes and study materials ensuring the compliance with the respective educational technology.
Methodology of implementation (duration, training, study modules, etc.)	The training duration for the bachelor's degree program with the specialization "Storage and processing technology for agricultural products/economist" is five years, or 300 credits. Students study special disciplines, such as: technical microbiology with the basics of winemaking, buildings and equipment, storage and processing technology for vegetables and potatoes, product quality management and standardization, basics of commodity science, storage and processing technology for fruit and berries, storage and processing technology for technical crops, technical and chemical production control, canning and drying fruit and vegetables, biochemistry of fruit and vegetables, scientific and theoretical basics of storage and processing technology for agricultural products, production technology of fruit and vegetable juices, production and storage technology for animal products, food safety, nutritional physiology, food additives, metrology, standardization and certification, HACCP standards, processes and machinery for food production, fruit and vine growing, etc.
How program quality is ensured	The quality of training program is ensured by conducting lectures and practical classwork. To back theoretical knowledge with practice, the students also complete apprenticeships at production enterprises and the University's research farms. The University has an Education Quality Management Department, which regularly performs internal quality control activities based on the strategy of constantly improving the quality of educational programs. It also monitors the students' academic progress.
Study program name (TAU)	*740204-2501 – Gardening agronomist/economist*
Area	**Food production**
Content	The curriculum content is aimed at teaching professional activities in the area of gardening and agricultural economics. The students learn *scientific* basics of organizing industrial gardens, modern methods of plant and vegetable growing in the field and under cover, subtropical fruit growing, storage and processing for agricultural products, phyto-pathology and entomology, general and specific fruit growing, vine growing, melon growing, pomology, agricultural biotechnology, physiology and biochemistry of fruit and vegetables; management, basics of entrepreneurship, accounting in agribusiness, basics of agricultural chemistry, basics of agricultural production organization, etc. The curriculum includes training plan, standards, subjects and

	other materials ensuring the quality of training, as well as programs for educational and production internships, calendar of classes and study materials ensuring the compliance with the respective educational technology.
Methodology of implementation (duration, training, study modules, etc.)	The training duration for the bachelor's degree program with the specialization "Gardening agronomist/economist" is five years, or 300 credits. Students study special disciplines, such as: organizing industrial gardens, gardening and vegetable growing in the field and under cover, subtropical fruit growing, storage and processing technology for agricultural products, phyto-pathology and entomology, general and specific fruit growing, vine growing, melon growing, pomology, agricultural biotechnology, physiology and biochemistry of fruit and vegetables; management, basics of entrepreneurship, accounting, agricultural chemistry, organization of agricultural production, and other disciplines related to the specific specialization.
How program quality is ensured	The quality of training program is ensured by conducting lectures and practical classwork. To back theoretical knowledge with practice, the students also complete apprenticeships at production enterprises and the University's research farms. The University has an Education Quality Management Department, which regularly performs internal quality control activities based on the strategy of constantly improving the quality of educational programs. It also monitors the students' academic progress.

KPITTU (named after Academician S. Osimi)

490101 – Storage and processing technology for plant food materials (Bachelor's degree study)

No.	**Disciplines** (related to food production and safety)	**Credits**	**Discipline content**
Semester 2 (one discipline total)			
1	Food chemistry	3	Analytical chemistry and its role in analyzing food products. Quality analysis of food products. Analytical classification of cations and anions in food products. Cation analysis in food products. Anion analysis in food products. Gravimetric analysis of food products. Titrimetric analysis of food products. Redoxymetry as a method of studying food product properties. Deposition as a method of studying food product properties. Physical and chemical methods to analyze food product properties.

No.	**Disciplines** (related to food production and safety)	Credits	Discipline content
Semester 3 (three disciplines total, 18 credits)			
1	Biochemistry of food products	6	Components in milk and peculiarities of physical and chemical properties; proteins, carbohydrates, fats, ministry substances in milk; milk ferments, vitamins, hormones, gases and foreign matters in milk. Changes in chemical composition and properties of milk under the impact of various factors. Changes in biochemical and physiological properties of milk during storage and processing, their impact on the quality of dairy products. Methods to analyze the quality of milk components. Meat biochemistry and its effects. Changes in biochemical properties of meat as a result of storage, processing and anthroponotic diseases. Methods to determine the content of water, proteins, carbohydrates and mineral substances in meat.
2	Processes and equipment in food production	6	Mechanical processes. Fragmentation process. Equipment for fragmentation and slicing. Classification of mechanical processes. Classification of equipment. Hydrothermal processes. Equipment for hydrothermal process treatment. Separation process. Centrifuge operating principles. Filtration process and its principles. Heat transfer processes. The laws of heat transfer. Condensation. Condensers and their operating principles.
3	Optional disciplines	6	Optional discipline(s) are selected by students at the end of Semester 2.
3	Microbiology and technological control in the industry	6	Morphological, physiological, genetic, environmental and biochemical properties of microorganisms and the influence of various factors on them. Water, soil and air microflora. The role of microorganisms in the nature and in human life. The use of microorganisms in industry. Use of microbiological technologies. Methods to obtain pure strains of microorganisms. Production of fermented milk products, milk and alcohol, proteins, fats, vitamins, ferments and antibiotics. Microbiological and sanitary control in production. Production microbes and their penetration methods. Pathogenic microorganisms in food industry. Sterilization, types and uses. Disinfection and its uses.
4	Theoretical basis of food production	6	Technology of bread and bakery products. Pasta production technologies. Sugar production technologies. Starch and starch goods production technologies. Caramel production technology. Bakery technology. Alcohol drinks technology. Vegetable oil technology. Canning technology. Modernization of food production technological processes.
5	Methods of food products analysis	6	Introductory course. Occupational safety in the lab. Organoleptic analysis methods for food products. Sample selection and preparation for physical and chemical tests. Gravimetric methods of analysis for food products. Thermal analysis of food products. Thermal gravimetric analysis-1. Analysis of moisture content in liquid food products. Thermal gravimetric analysis-2. Analysis of moisture content in solid food products. Refractometry-1. Refractometry analysis of liquid food products. Refractometry-2. Refractometry analysis of solid food products. Spectral photometry-1. Spectral analysis of liquid food products. Spectral photometry-2. Spectral analysis of solid food products. Potentiometry. Identifying acidity of some food products. Microscopy-1. Identifying the microstructure of food products. Microscopy-2. Identifying bacterial contamination of food

No.	**Disciplines** (related to food production and safety)	Credits	Discipline content
			products.
6	Optional disciplines	6	Optional discipline(s) are selected by students at the end of Semester 2.
Semester 5 (two disciplines total, 19 credits)			
1	Technology of bread, production, bakery and grain processing	7	The role and value of grains in the development of flour-milling industry. Technological process of processing wheat into flour. General characteristics of bakery products. Technological process for producing bread from wheat flour, rye flour. National bread products. Improving flour production technologies. Improving bread production technologies.
2	Optional disciplines	12	Optional discipline(s) are selected by students at the end of Semester 4.
Semester 6 (three disciplines total, 23 credits)			
1	Oil production technology	7	Oilseeds as materials for oil production. Cotton seeds. Soybean seeds. Sunflower, rape seeds. Preparing seeds to processing. Storage of oilseed crops and their properties. Removing foreign matters. Drying oilseed crop seeds. Hulling and shelling the seeds. Seed fragmentation technology. Pressing. Forepress and expeller. Filtering oil.
2	Production practice	4	
3	Optional disciplines	12	Optional discipline(s) are selected by students at the end of Semester 4.
Semester 7 (five disciplines total, 30 credits)			
1	Canning technology	6	Classification of canned plant products. Plant materials for canned food production. Fruit and berry juices. Key processes in juice production. Technology of juice production from stone fruit. Technology of juice production from pomaceous fruit. Clarified juices. Production of clarified grape juice. Canning technology for concentrated juices. Canning technology for fruit and berry pastes. Fruit and berry compote production technology. Fruit and berry canning technology with sugar. Jam and confiture production technology. Fruit preserve production technology
2	Food concentrate technology	6	Characteristics and properties of food concentrates. Powdered milk production technology. Cereal production technology. Pea meal production technology. Boiled-dried cereal production process and technology. Soup concentrates. Diet oatmeal production equipment. Potato food concentrates production equipment.
3	Economics and establishment of food production enterprises	6	Introductory course. Food industry as a sector of the economy. Structure of the food market. Placement of food industry enterprises. Concentration of production and market authorities. Specialization, cooperation and combination. Production integration and diversification. Competition. Coordination and pricing in the food markets. Prospects for improving efficiency in food processing industries of the agribusiness sector. Economic and social development of food industry.
4	Optional disciplines	12	Optional discipline(s) are selected by students at the end of Semester 6.
Semester 8 (four disciplines total, 30 credits)			

No.	**Disciplines** (related to food production and safety)	**Credits**	**Discipline content**
1	Pre-degree internship and preparation of bachelor's thesis	14	
2	Final attestation	4	
3	Optional disciplines	12	Optional discipline(s) are selected by students at the end of Semester 6.

490102 – Animal materials processing and storage technologies (Bachelor's degree study)

No.	**Disciplines** (related to food production and safety)	**Credits**	**Discipline content**
Semester 2 (two disciplines total, 5 credits)			
7	Food chemistry	3	Analytical chemistry and its role in analyzing food products. Quality analysis of food products. Analytical classification of cations and anions in food products. Cation analysis in food products. Anion analysis in food products. Gravimetric analysis of food products. Titrimetric analysis of food products. Redoxymetry as a method of studying food product properties. Deposition as a method of studying food product properties. Physical and chemical methods to analyze food product properties.
8	Practical training	2	
Semester 3 (three disciplines total, 18 credits)			
1	Biochemistry of food products	6	Components in milk and peculiarities of physical and chemical properties; proteins, carbohydrates, fats, ministry substances in milk; milk ferments, vitamins, hormones, gases and foreign matters in milk. Changes in chemical composition and properties of milk under the impact of various factors. Changes in biochemical and physiological properties of milk during storage and processing, their impact on the quality of dairy products. Methods to analyze the quality of milk components. Meat biochemistry and its effects. Changes in biochemical properties of meat as a result of storage, processing and anthroponotic diseases. Methods to determine the content of water, proteins, carbohydrates and mineral substances in meat.
2	Processes and equipment in food production	6	Mechanical processes. Fragmentation process. Equipment for fragmentation and slicing. Classification of mechanical processes. Classification of equipment. Hydrothermal processes. Equipment for hydrothermal process treatment. Separation process. Centrifuge operating principles. Filtration process and its principles. Heat transfer processes. The laws of heat transfer. Condensation. Condensers and their operating principles.
3	Optional disciplines	6	Optional discipline(s) are selected by students at the end of Semester 2.
Semester 4 (four disciplines total, 24 credits)			
1	Microbiology and	6	Morphological, physiological, genetic, environmental and

No.	**Disciplines** (related to food production and safety)	**Credits**	**Discipline content**
	technological control in the industry		biochemical properties of microorganisms and the influence of various factors on them. Water, soil and air microflora. The role of microorganisms in the nature and in human life. The use of microorganisms in industry. Use of microbiological technologies. Methods to obtain pure strains of microorganisms. Production of fermented milk products, milk and alcohol, proteins, fats, vitamins, ferments and antibiotics. Microbiological and sanitary control in production. Production microbes and their penetration methods. Pathogenic microorganisms in food industry. Sterilization, types and uses. Disinfection and its uses.
2	Theoretical basis of food production	6	Technology of bread and bakery products. Pasta production technologies. Sugar production technologies. Starch and starch goods production technologies. Caramel production technology. Bakery technology. Alcohol drinks technology. Vegetable oil technology. Canning technology. Modernization of food production technological processes.
3	Methods of food products analysis	6	Introductory course. Occupational safety in the lab. Organoleptic analysis methods for food products. Sample selection and preparation for physical and chemical tests. Gravimetric methods of analysis for food products. Thermal analysis of food products. Thermal gravimetric analysis-1. Analysis of moisture content in liquid food products. Thermal gravimetric analysis-2. Analysis of moisture content in solid food products. Refractometry-1. Refractometry analysis of liquid food products. Refractometry-2. Refractometry analysis of solid food products. Spectral photometry-1. Spectral analysis of liquid food products. Spectral photometry-2. Spectral analysis of solid food products. Potentiometry. Identifying acidity of some food products. Microscopy-1. Identifying the microstructure of food products. Microscopy-2. Identifying bacterial contamination of food products.
4	Optional disciplines	6	Optional discipline(s) are selected by students at the end of Semester 2.
Semester 6 (three disciplines total, 23 credits)			
1	Meat and meat products processing technology	7	Transporting animals to processing. Reception of the animals and keeping the animals at processing enterprises. Cattle processing technology. Goats and sheep processing technology. Poultry and rabbits processing technology. Guts processing technology. By-products processing technology. Prefabricated meat products production technology. Sausage production technology. Canned meat products production technology. Animal fat processing technology. Skins processing technology. Leather production technology. Blood processing technology. Organs and special materials processing technology. Technical animal products processing technology.
2	Production practice	4	
3	Optional disciplines	12	Optional discipline(s) are selected by students at the end of Semester 4.
Semester 7 (five disciplines total, 30 credits)			
1	Milk and dairy products	6	The value of milk and dairy products. History of dairy industry development. Biochemical properties of milk. Primary milk

No.	Disciplines (related to food production and safety)	Credits	Discipline content
	processing technology		processing at the farms. Drinking milk production technology. Dairy cream production technology. Milk separation technology. Fermented milk products. Curds production technology. Cheese production technology. Dairy butter production technology. Ice cream production technology. Milk powder and powdered products production technology. Canned milk production technology.
2	Food concentrate technology	6	Characteristics and properties of food concentrates. Powdered milk production technology. Cereal production technology. Pea meal production technology. Boiled-dried cereal production process and technology. Soup concentrates. Diet oatmeal production equipment. Potato food concentrates production equipment.
3	Economics and establishment of food production enterprises	6	Introductory course. Food industry as a sector of the economy. Structure of the food market. Placement of food industry enterprises. Concentration of production and market authorities. Specialization, cooperation and combination. Production integration and diversification. Competition. Coordination and pricing in the food markets. Prospects for improving efficiency in food processing industries of the agribusiness sector. Economic and social development of food industry.
4	Optional disciplines	12	Optional discipline(s) are selected by students at the end of Semester 6.
Semester 8 (four disciplines total, 30 credits)			
1	Pre-degree internship and preparation of Bachelor's thesis	14	
2	Final attestation	4	
3	Optional disciplines	12	Optional disciplines are selected by students at the end of Semester 6.

740206 – Production, processing and storage of plant products (Bachelor's degree study)

No.	Disciplines (related to food production and safety)	Credits	Discipline content
Semester 2 (three disciplines total, 14 credits)			
1	Agricultural chemistry	6	Subject, methods, goals and objectives of agricultural chemistry. Chemical composition of plants and plant nutrition. Soil chemical properties and fertility. Chemical soil melioration. Mineral fertilizers. Organic fertilizers. Fertilizer application system. Chemical research methods in agriculture. Fertilizer storage, preparation and application technology. Fertilizers and environment. Eco-friendly agricultural chemistry. Economic and energy efficiency of fertilizers.
2	Farming agriculture	6	The notion of organic farming. Laws of nature. Soil productivity. Soil treatment. Agricultural crop rotation. Green manure. Mixed sowing. Quick hedge. Edge effect. Efficient use of natural energy. Infrastructure preparation. Compost. Melon irrigation methods.

No.	Disciplines (related to food production and safety)	Credits	Discipline content
			Using organic farming to improve soil fertility and agricultural crop yield. Using natural factors for plant development. Liquid plant fertilizers. Mulching. Plant protection.
3	Practical studies	2	
Semester 3 (three disciplines total, 18 credits)			
1	Melioration in agriculture	6	General understanding of melioration in agriculture; irrigation system, irrigation rate, irrigation rate during plant vegetation period, purposes of irrigation; methods and techniques of agricultural crop irrigation; sprinkler irrigation, furrow irrigation, drip irrigation, subsurface irrigation; choosing the suitable irrigation method; anti-salinity measures; determining drainage channel parameters.
2	Crop farming	6	Current status and development forecasts of crop farming in Tajikistan. General information on vegetable farming. Biological characteristics of vegetable crops, history of selection. Development of selection and seed farming. Indoor vegetable growing. Species and varieties of grain crops and growing technology. Soil and variety selection for growing corn for grain and sorghum production. Cabbage growing technology. Root crop types and growing technologies. Vegetable growing methods. Preparing technological maps. Cucumber varieties and growing technologies. Crop diseases and pests.
3	Optional disciplines	6	Optional discipline(s) are selected by students at the end of Semester 2.
Semester 4 (four disciplines total, 24 credits)			
1	Production of plant products	6	Current status and development forecasts of crop farming in Tajikistan. Species and varieties of grain crops and growing technology. Soil and variety selection for growing corn for grain and sorghum production. Grain growing technology. Legume crop types and growing technologies. Oilseed growing methods. Tuber crop growing technologies. The value and growing technology of technical crops. Grass for cattle feeding. Preparing technological maps. Varieties and growing technologies of grains, melons and legumes.
2	Methods of food products analysis	6	Introductory course. Occupational safety in the lab. Organoleptic analysis methods for food products. Sample selection and preparation for physical and chemical tests. Gravimetric methods of analysis for food products. Thermal analysis of food products. Thermal gravimetric analysis-1. Analysis of moisture content in liquid food products. Thermal gravimetric analysis-2. Analysis of moisture content in solid food products. Refractometry-1. Refractometry analysis of liquid food products. Refractometry-2. Refractometry analysis of solid food products. Spectral photometry-1. Spectral analysis of liquid food products. Spectral photometry-2. Spectral analysis of solid food products. Potentiometry. Identifying acidity of some food products. Microscopy-1. Identifying the micro structure of food products. Microscopy-2. Identifying bacterial contamination of food products.
3	Tractors and agricultural machinery	6	General construction of tractors and agricultural vehicles. Vehicle and tractor parts. Transmission, chassis, controls. Primary and ancillary equipment. Performance indicators of tractors and

No.	**Disciplines** (related to food production and safety)	**Credits**	**Discipline content**
			vehicles. General construction of agricultural machinery. Soil treatment machines. Fertilizer application machines. Crop sowing and planting machines. Crop handling and crop protection machines. Grain, legumes and cereal crop harvesting machines
4	Optional disciplines	6	Optional discipline(s) are selected by students at the end of Semester 2.
Semester 5 (two disciplines total, 19 credits)			
1	Gardening	7	Current state and the future of gardening. Horticultural classification and biological value of fruit trees. Basics of biology, establishment rate, yield, winter hardness of fruit trees. Morphological structure and biological value of fruit trees and shrubs. Importance of biological development of fruit trees. Root stock lifting and storage. Grafting types. Nursery gardens: the current state of nursery farming. Sapling growing technology. Shrub nurseries. Grape growing technology. Conducting field works at nurseries. Pests and diseases.
2	Optional disciplines	12	Optional disciplines are selected by students at the end of Semester 4.
Semester 6 (three disciplines total, 23 credits)			
1	Grain and technical crops processing technology	7	Classification of technical and grain crops. The impact of storage and processing on the quality of plant products. Grain storage equipment. Stationary grain storage. Primary grain processing technology. Grain crops preparation for processing. Physiological processes in grain heaps, and their impact on storage methods. Grain to flour processing technology. Usage of grains in industry. Preparing and storing raw cotton. The importance of vegetable oil and its production methods.
2	Production practice	4	
3	Optional disciplines	12	Optional disciplines are selected by students at the end of Semester 4.
Semester 7 (five disciplines total, 30 credits)			
1	Plant products processing technology	6	Importance of plant products in human nutrition. Chemical composition of plant products. Product qualities and standardization of plant products. Impact of production conditions and growing techniques on the quality and storage life. Principles of storing plant products. General characteristics of harvesting, transportation and processing of plant products. Key storage methods and technologies for plant products. Canning of fruit and vegetables through sterilization. Compote and juice production technology. Canning technology using sugar. Microbiological preservation technologies. Deep-freeze preservation technology using chemical preservatives and special tare for fruit and vegetables. Baby food and diet products. Plant products drying technology.
2	Marketing in agriculture	6	Market as a prerequisite and objective economic basis of marketing. Social and economic essence and content of marketing. Key marketing principles. Socially responsible marketing. Functions of marketing. Goals, objectives and methods of marketing studies. Market segmentation. Studying market structure. Studying internal environment of the

No.	**Disciplines** (related to food production and safety)	Credits	Discipline content
			enterprises. Goods in the marketing system. New products in a marketing strategy. Maintaining quality and competitiveness of goods through marketing. Service as part of commodity policy and marketing activities. Distribution channels and merchandise movement. Wholesale and retail trading. Direct marketing, personal selling, sales force.
3	Metrology, standardization and certification	6	Goals and objectives of metrology, standardization and certification. Objects and subjects, methods and techniques. Rules and procedures of certification. Mandatory and optional certification. State standardization system. State technical regulation and metrology system in Tajikistan. International and national standardization systems. Theory and methods of measurement for metrological properties. Certification of food and non-food products. Scientific and methodological basis for building product certification systems. Peculiarities of goods and services certification. Certification of quality management systems. ISO international standards. National standardization system. Metrological support of certification for products and quality management systems.
4	Optional disciplines	12	Optional disciplines are selected by students at the end of Semester 6.
Semester 8 (four disciplines total, 30 credits)			
1	Pre-degree internship and preparation of bachelor's thesis	14	
2	Final attestation	4	
3	Optional disciplines	12	Optional disciplines are selected by students at the end of Semester 6.

490101 – Processing and storage technology for plant products (Master's degree study)

No.	**Disciplines** (related to food production and safety)	**Credits**	**Discipline content**
Semester 1 (four disciplines total, 24 credits)			
1	Instrumental methods for testing food products	6	The role of instrumental methods in testing the quality and composition of food products. Basics of spectral analysis methods for canned food products. Spectral photometry as a method to identify presence of heavy metals in canned products. The use of spectral photometry to test canned meat products for hazardous substances. Spectral photometry for testing the quality of oil products. Spectral photometry for testing quality of egg concentrates. Spectral research methods for testing the quality of dairy and protein concentrates (the Lowry method). Theoretical basics of refractometry tests for food products. Refractometry of dairy canned products and cheeses. Refractometry of condensed milk and powdered milk products. Mathematical processing of test results.
2	Optional disciplines	6	
3	Research practice	6	
4	Innovative production technology for plant products and their ingredients	6	Discipline content under development
Semester 2 (five disciplines total, 30 credits)			
1	Biotechnology products	6	Discipline content under development
2	Basics of food quality management	6	
3	Scientific and teaching practice	6	
	Research works	6	
5	Optional disciplines	6	
Semester 3 (three disciplines total, 30 credits)			
1	Chemical analysis of food products	6	Discipline content under development
2	Scientific and teaching practice	6	
3	Research works	6	
4	Optional disciplines	12	
Semester 4 (two disciplines total, 30 credits)			
1	Master's thesis preparation	24	

No.	Disciplines (related to food production and safety)	Credits	Discipline content
2	Preparation for state attestation	6	

490102 - Processing and storage technology for animal products (Master's degree study)

No.	Disciplines (related to food production and safety)	Credits	Discipline content
Semester 1 (four disciplines total, 24 credits)			
1	Instrumental methods for testing food products	6	The role of instrumental methods in testing the quality and composition of food products. Basics of spectral analysis methods for canned food products. Spectral photometry as a method to identify presence of heavy metals in canned products. The use of spectral photometry to test canned meat products for hazardous substances. Spectral photometry for testing the quality of oil products. Spectral photometry for testing quality of egg concentrates. Spectral research methods for testing the quality of dairy and protein concentrates (the Lowry method). Theoretical basics of refractometry tests for food products. Refractometry of dairy canned products and cheeses. Refractometry of condensed milk and powdered milk products. Mathematical processing of test results.
2	Optional disciplines	6	
3	Research works	6	
4	Innovative canning technology for food products	6	Discipline content under development
Semester 2 (five disciplines total, 30 credits)			
1	Modelling technological processes of food products	6	Discipline content under development
2	Wasteless canning technology	6	Discipline content under development
3	Scientific and teaching practice	6	
4	Research works	6	
5	Optional disciplines	6	
Semester 3 (four disciplines total, 30 credits)			
1	Chemical analysis of food products	6	Discipline content under development
2	Scientific and teaching practice	6	
3	Research works	6	

No.	**Disciplines** (related to food production and safety)	**Credits**	**Discipline content**
4	Optional disciplines	12	
Semester 4 (two disciplines total, 30 credits)			
1	Master's thesis preparation	24	
2	Preparation for state attestation	6	

740206 – Production, storage and processing of plant products (Master's degree study)

No.	**Disciplines** (related to food production and safety)	**Credits**	**Discipline content**
Semester 1 (three disciplines total, 18 credits)			
1	History and methodology of plant products production technology	6	The history and understanding of agronomy science. History of farming development. History and methodology of agronomy science. Key principles of modern farming. History of agronomy science in 13-18 century. Methodology, object, subject and methods of researching the farming system. Modules and methodology for improving yield, principles of fertilizer application.
2	Optional disciplines	6	
3	Research works	6	
Semester 2 (eight disciplines total, 30 credits)			
1	Field testing methods	6	Discipline content under development
2	Innovative production technology for plant products	6	
3	Scientific and teaching practice	6	
4	Research works	6	
5	Optional disciplines	6	
Semester 3 (six disciplines total, 30 credits)			
1	Instrumental analysis methods in the production of plant products	6	Discipline content under development
2	Scientific and teaching practice	6	
3	Research works	6	
4	Optional disciplines	12	
Semester 4 (four disciplines total, 30 credits)			

No.	Disciplines (related to food production and safety)	Credits	Discipline content
1	Master's thesis preparation	24	
2	Preparation for state attestation	6	

1.1.4. Existing material and technical facilities

Existing University labs that are accessible in practice are currently used to conduct studies and research in areas representing food (particularly with regards to safety and quality of food products) and veterinarian technologies related to food products.

Name of equipment/lab	Operating features (what type of measurement can be provided)	What University has the equipment
Veterinarian Sanitary Examination Chair labs		
Expert-001 pH-meter	Analysis of natural and effluent water, technological solutions and water extracts in samples of plant and animal products	TAU
Clever-2 milk analyzer	Simultaneous identification of fat content, dry matter content, proteins, moisture content, density, densitometer for measuring density and temperature of the sample taken	
ON-10 desktop ovoscope	For examining eggs	
Microscope with monitor	For bacteriological research	
Grain and seed quality examination lab		
Thermostat	For growing agricultural crops from seeds	TAU
IDK-3M appliance	For identifying fiber viscosity	
Electronic scales	For precisely measuring sample mass	
LMU-1M laboratory mill	For milling grains	
DZS-2M diaphanoscope	For identifying vitreousity of the seeds	
Electronic microscope	For analyzing and monitoring microorganisms	
Food safety and quality lab		
Soxlet extractor	For identifying fat content in food products	KPITTU
Evlas-2M analyzer	For identifying moisture content in food products	
KETT FD-610 analyzer	For identifying moisture content in food products	
IRF-464 refractometer (for milk)	For identifying content of water-soluble dry matter in food products	
IRF-454 B2M universal refractometer	For identifying content of water-soluble dry matter in food products	
PE-5300V spectral photometer	For determining the chlorophyll content, quantitative tests for heavy metals, etc.	
PAL-ATAGO universal refractometer (Japan)	For identifying content of water-soluble dry matter in food products	
Checker 1 pH-meter (#H198103)	For measuring the activity of hydrogen ions in water solutions	

Name of equipment/lab	Operating features (what type of measurement can be provided)	What University has the equipment
Hep+ pH-meter (#H198108)	For measuring the activity of hydrogen ions in water solutions	
Checktemt thermometer	For measuring the temperature of food products	
Checktemt thermometer (HI98509)	For measuring the temperature of food products	
Analytical scales, 0.1 gr precision, 6000 gr maximum capacity	For gravimetric measurements of various samples	
Analytical scales, 0.1 gr precision, 500 gr maximum capacity	For gravimetric measurements of various samples	
Laboratory mill	For fragmenting grain products	
KFK-2 electric photo colorimeter	For measuring individual bands within 315-980 ηm wavelength spectrum isolated by optical filters, with the aim of determining the transparency and optical density of liquid solutions, diffusive suspensions, emulsions and colloidal solutions and solids.	
Thermostat	For growing microorganism strains in nutritional broth	
SX-4-10 muffle kiln	For thermal treatment of various materials	
303-2 thermostat	For growing microorganism strains in nutritional broth	
K-55 drying oven	For drying food products	KPITTU
High-speed centrifuge (1600 rpm, 0.5 ml, 1.5x12)	For separation non-homogeneous food products	
Microscope		
Densitometer set	For determining density of liquid products	
Samsung microwave oven with dual-sided heating	For infrared heating of various products	
Firuzeh drying cabinet	For infrared drying	
XSZ-N107 biological stereo microscope	For routine photo and video recording of biological, bacteriological, cytological and other measurements	KPITTU
SES-3M electrical drying cabinet	For drying, heating, calcination and other tests of various materials	
PE-5300V spectral photometer	For measuring the transparency and optical density of liquid samples for various purposes.	

1.1.5. Minimum knowledge level students need to pursue education

1.1.5.1. Master's degree studies

Tajik Agrarian University named after Sh.Shotemur (TAU)

Students are eligible for master's degree with specialization in "Storage and processing technology for fruit and vegetables" after completing the following undergraduate studies:

- Bachelor on storage and processing technology of fruit and vegetables;
- Specialists on storage and processing technology of agricultural products – economist;
- Bachelor on storage and processing technology of agricultural products (animal products);
- Students completing bachelor's degree studies in "Storage and processing technology of fruit and vegetables" from other Universities of Tajikistan;
- Bachelor's degree graduates with other specializations from TAU biological department.

1.1.5.2. Bachelor's degree studies (TAU)

Students can be enrolled in bachelor's degree program with specialization "Storage and processing technology of fruit and vegetables" after passing entrance exams at the National Testing Center under the Government of the Republic of Tajikistan. Main subjects of the exams are mathematics, biology and chemistry. Agricultural college graduates with specialization "Storage and processing technology of fruit and vegetables" can also be accepted for bachelor's degree studies.

1.2. ANALYSIS OF THE ENVIRONMENT FOR PRODUCTION OF FOOD PRODUCTS AND PROCESSING INDUSTRY

1.2.1. Legislative and regulatory documents governing and regulating the production and processing of food products, including implementation of GLOBAL GAP and HACCP standards

In the area of food safety, TajikStandard (The Agency for Standardization, Metrology, Certification and Trading Inspection under the Government of the Republic of Tajikistan) and sanitary and epidemiological service (State Sanitary and Epidemiological Oversight Service under the Ministry of Healthcare and Social Protection of the Population of the Republic of Tajikistan) are responsible for preventative and current monitoring of food industry enterprises, public catering outlets and food retail stores at operational and processing levels.

Document name	Relation to the project (what needs to be considered when designing and implementing the project)	In English and/or Russian
The Law of the Republic of Tajikistan "On Quality and Safety of Food Products" No.890 of 1 August 2012	This law applies to activities related to safety of food products during production, processing, transportation, storage, sale of food products and their ingredients, including diet food, baby food, and nutritional supplements. The provisions of the Law also apply to materials, products, packaging and auxiliary materials related to food products. Articles: Requirements to quality and safety of new food products, materials and goods during design and launch into production, packaging, marking and sale.	Russian
The Law of the Republic of Tajikistan "On Biological Safety" No.88 of 1 March 2005	Articles: Activities related to biological safety. State governance on biological safety.	Russian
Collection of regulatory documents related to sanitary and epidemiological control No.1, No.2	Documents ensuring sanitary and epidemiological safety of the people, prevention and treatment of elementary diseases, disposal of industrial and domestic waste products.	Russian
State standards	The specialists' work will be related to these regulatory documents, which will be used as the basis for comparing the data obtained to the requirements of the standards	Russian

International standards	The international standards will be used to control quality and safety compliance for food products produced for domestic market, and compliance of the products produced for external markets with the international standard requirements. They stimulate the development of new quality management systems and improvement of the existing ones, their certification at the international level. The key goal of this activity is to enable an independent evaluation of the quality and safety of production, goods and services for the developed market oriented at the interests of the consumers.	Russian
GOST (international standards)	As the main category of standards used within the former USSR space, GOST standards are established mainly for mass-manufactured items, as well as for norms, rules, requirements, terms, definitions, and other items that need to be established to ensure optimum quality of food products, their safety, unity and interconnection between various areas of science, technology, production, culture, etc.	Russian
Industry standards	*Industry standards applying to some food products* are mandatory for all enterprises and organizations in the specific industry. They establish requirements to products that is not covered by state standards and may limit the application of state standards for goods, sizes, etc., used in the specific industry; at the same time, they have to be in compliance with the quality and safety requirements for consumers.	Russian
Technical conditions	Rules, methods and requirements established and enforced by an individual enterprise making certain products, which determine the criteria for specific goods, materials, substances and their groups. Additionally, they must indicate the procedures that can be used to enforce these requirements.	Russian
The Law of the Republic of Tajikistan on sanitary and epidemiological safety No.49 of 08 August 2003	Master's degree students must be introduced to the Law on sanitary and epidemiological safety	Russian and Tajik
The Law of the Republic of Tajikistan on quality and safety of food products No.4 of 10 May 2002	Master's degree students must be introduced to the Law on quality and safety of food products	Russian and Tajik
The Strategy of nutrition and physical activity in the Republic of Tajikistan for 2015-2024	Master's degree students must be introduced to the Strategy of nutrition and physical activity	Russian and Tajik
Sanitary norms for design of industrial enterprises (SN 245-71)	Master's degree students must be introduced to the Sanitary norms for design of industrial enterprises	Russian
SanPiN (Sanitary Rules and Regulations) 2.2.1/2.1.1.1200-03. Sanitary protection areas and sanitary classification of enterprises, structures and other facilities	Master's degree students must be introduced to the Sanitary norms for protection areas and sanitary classification of enterprises, structures and other facilities	Russian

Sanitary rules for design of dairy industry enterprises, VSTP-6.01-92	Master's degree students must be introduced to the Sanitary norms for design of dairy industry enterprises	Russian
Technological design norms for dairy industry enterprises, VNTP-645-1618-92.	Master's degree students must be introduced to the Technological design norms for dairy industry enterprises	Russian
Technological design norms for family farms, small enterprises in processing industries (dairy industry), VNTP-645/1645-92.	Master's degree students must be introduced to the Technological design norms for family farms, small enterprises in processing industries	Russian
SanPiN 2.3.4.15-15-2005 Sanitary and hygiene requirements related to the production of meat and processed meat products	Master's degree students must be introduced to the Sanitary and hygiene requirements related to the production of meat and processed meat products	Russian
SanPiN 2.3.4.551-96 Production of milk and dairy products	Master's degree students must be introduced to the sanitary norms related to the production of milk and dairy products	Russian
SanPiN 1.1.1058-01 Organizing and conducting industrial control over the observance of sanitary rules and performance of sanitary and epidemiological prevention events	Master's degree students must be introduced to the norms on Organizing and conducting industrial control over the observance of sanitary rules and performance of sanitary and epidemiological prevention events	Russian
SanPiN 2.3.2.1078-01 Hygiene requirements to safety and nutritional value of food products	Master's degree students must be introduced to the Requirements to safety and nutritional value of food products	Russian
SanPiN 2.3.2.1324-03 Hygiene requirements to shelf life and storage conditions of food products	Introducing the Master's degree students to the Hygiene requirements to shelf life and storage conditions of food products	Russian
SanPiN 2.3.5.021-94 Sanitary rules for public catering enterprises and food retail outlets	Master's degree students must be introduced to the Sanitary rules for public catering enterprises and food retail outlets	Russian
SanPiN 42-123-4117-86 Storage conditions and terms for perishable food products	Master's degree students must be introduced to the Storage conditions and terms for perishable food products	Russian
SanPiN 2.3.6.1066-01 Sanitary and epidemiological requirements to organizing trading and circulation of production materials and food products	Master's degree students must be introduced to the Sanitary and epidemiological requirements to organizing trading and circulation of production materials and food products	Russian

1.2.2. Number and profiles of legal entities (state-owned and private companies) demanding specialists in the area of food safety and quality

The food industry consists of 21 sub-sectors, including fruit and vegetable canning, production of fresh fruit and vegetables and their processing into dried fruit, production of meat, meat products and dairy products, production of feeds and confectionery. More than 800 companies are operating in the sector. Most of them are small enterprises; some are seasonal and limited to sales in the local markets.

There are currently about 65,000 private dekhkan (farming) households in the country, most of which are small homestead farms.

Private sector dominates Tajikistan's food industry. Definitely, the enterprises need to learn in the open market environment, where they are likely to face serious issues while trying to meet the nation's demands within a short period of time, with sufficient amount of food products capable of competing with imported food products, entering foreign markets and increasing exports.

To overcome the obstacles and succeed, food industry specialists need to find the solutions to goals and objectives they are facing, particularly the following two:

1) Low quality of food products;
2) Insufficient safety of food products, which is acknowledged not only by producers but also by regulatory organizations.

1.2.3. Stakeholders: companies and institutions in need of highly skilled human resources

1) **Companies producing and processing food products:**

- Milk and dairy products;
- Meat and dairy products;
- Consolidators, purchasing agents and suppliers of inputs;
- Production and farming cooperatives;
- Family and individual farming households;
- Canned food producers (fruit and vegetable canning factories);
- Bread, pasta, confectionery and food concentrate makers;
- Oil producers;
- Fermented products and wine production;
- Storage and processing of grains;
- Milk factories (in Dushanbe and Kurgantube), meat processing factories, refineries, bakeries;
- Institutions producing convenience foods – state-owned and private dekhkan households.

2) **Public catering enterprises:**

- Restaurants, cafes, teahouses, cafeteria, etc.

3) **Regulatory and monitoring institutions:**

- Ministry of agriculture of the Republic of Tajikistan;
- Ministry of industry;
- Agency for standardization, metrology and certification under the Government of Tajikistan;
- State sanitary and epidemiological oversight service under the Ministry of healthcare and social protection of the Republic of Tajikistan.

4) **Food research institute**

5) **Higher learning institutions:**

- Tajik Agrarian University (named after Sh.Shotemur);
- Khujand Polytechnic Institute of Tajik Technical University.

1.2.4. Characteristics of the production environment and requirements

1.2.4.1. Requirements to quality and safety of food production (meat, milk, eggs, fruit and vegetables)

1.2.4.2. List of chemical substances permitted in food production (meat, milk, eggs, fruit and vegetables)

1.2.4.3. Production and processing control system

1.2.4.4. Key quality and safety issues in the production and processing of food products (meat, milk, eggs, fruit and vegetables)

1.3. AREAS AND SPECIALIZATIONS WHERE UNIVERSITY GRADUATES CAN WORK AFTER COMPLETING THEIR STUDIES

Area and activities	Professions and positions
State control on quality and safety of food products: - *Agency for standardization, metrology and certification under the Government of the Republic of Tajikistan;* - *State unitary enterprise "Hurokvori";* - *Chamber of industry and commerce of the Republic of Tajikistan (Agency for expert examination and certification);* - *Fruit and vegetable canning factories, wineries*	- specialists, experts, external auditors for food safety and quality
Production management at food industry enterprises	- manager for food safety and quality
State Standard institutions responsible for determining the quality of food products	- food safety auditor
Food industry enterprises: milk factories, meat factories, refineries	- manager for food safety and quality
Tajik Consumers Union	- internal auditor/inspector in charge of monitoring quality of inputs, convenience foods and finished products in the public catering industry

1.4. IDENTIFYING GAPS IN KNOWLEDGE, SKILLS AND ABILITIES NEEDED

Areas	Comments
Lack of theoretical knowledge and practical skills in students regarding internationally recognized food safety management standards and systems	This is due to the fact that study curricula do not focus adequately on studying universally recognized food safety management standards and systems along the value chain (*from farmers to processors, transportation companies, distributors, etc.*)
Lack of knowledge on: – Global GAP (Good Agricultural Practice) standard for production/growing (at the farmer level) of fresh food products; – HACCP (Hazard Analysis and Critical Control Points) system for processing (at the processor level) of food products	Due to the lack of coordination between export-oriented processors and Universities; absence of modern lab equipment for evaluating the quality and safety of food products.

1.5. AVAILABLE SOURCES OF INFORMATION ON THE CURRENT STATE OF QUALITY AND SAFETY IN FOOD INDUSTRY

Report name	Relation to the project (what needs to be considered when designing and implementing the project)	In English and/or Russian
"Regions of Tajikistan", annual publications by the Statistics Agency under the President of the Republic of Tajikistan	A study and analysis of these sources and literature gives an idea of the output of food industry in Tajikistan; the publications also provide statistics for production and processing of various types of products, their comparative annual levels, etc.	Russian
"Food Safety and Poverty", an information newsletter of the Statistics Agency under the President of the Republic of Tajikistan (4 times a year)	Ways to ensure safety of food products; prospects and development trends in food production	Russian
"SIFAT" (Quality) quarterly magazine published by the Agency for standardization, metrology, certification and trading inspection under the Government of Tajikistan	Food safety in Tajikistan, methods for achieving it. Activities of the Tajik Standard agency related to food safety.	Tajik
"Industry", annual publication of the Statistics Agency under the President of the Republic of Tajikistan	Implementation of new technologies, technical methods available, etc. in the food industry	Russian

2. ANALYSIS OF THE SITUATION IN KYRGYZSTAN

2.1. ANALYSIS OF THE HIGHER EDUCATION SYSTEM RELATED TO THE QUALITY AND SAFETY OF FOOD PRODUCTS

2.1.1. Legislation related to managing and regulating higher education, development and implementation of education curricula and their support

Document name	Relation to the project (what needs to be considered when designing and implementing the national development strategies)	In English and/or Russian
The Law of the Kyrgyz Republic On Education No.92 of 30 April 2003	Articles: Article 5. State education standards Article 10. Charters of educational institutions Article 11. Education curricula Article 22. Higher vocational education Article 25. Academic certificates Article 34. State regulatory bodies in the education system Article 37. Competencies of educational institutions Article 46. Material and technical support of educational institutions	Russian
Decree of the Government of Kyrgyz Republic No.496 of 23 August 2011 "On establishing a dual-level structure of higher vocational education in the Kyrgyz Republic"	- Draft of the State Education Standard for Higher Vocational Education in Kyrgyz Republic, Bachelor's degree training; - Draft of the State Education Standard for Higher Vocational Education in Kyrgyz Republic, Master's degree training; - Draft of the State Education Standard for Higher Vocational Education in Kyrgyz Republic, specialization; - List of training areas in higher vocational education confirmed by awarding the graduate with academic degree of Bachelor; - List of training areas in higher vocational education confirmed by awarding the graduate with academic degree of Master;	Russian
Decree of the Government of Kyrgyz Republic No.53 of 03 February 2004 "On approving the Regulation on higher vocational education institutions in Kyrgyz Republic"	IV. Educational activities of higher learning institutions: An educational organization of higher vocational education of Kyrgyz Republic (a higher learning institution) is a research and education organization established in accordance with the Law of the Republic of Kyrgyzstan "On Education" with the aim of delivering vocational education programs of higher, post-graduate and additional vocational education, as well as secondary vocational and secondary general education programs. The higher learning institution provides training, re-training, career advancement services for workers with higher education, and trains academic and pedagogical workers (Candidates and Doctors of Sciences).	
Decree of the Government of Kyrgyz Republic No.346	The Regulation on structural units of higher and secondary vocational education institutions	Russian

of 29 May 2012 "On approving the Regulation on structural units of higher and secondary vocational education institutions implementing additional vocational education curricula"	implementing additional vocational education programs regulates the procedure and conditions of implementing additional vocational education programs in Kyrgyz Republic.	
Decree of the Government of Kyrgyz Republic No.346 of 29 May 2012 "On approving the Regulation on structural units of higher and secondary vocational education institutions implementing additional vocational education curricula"	1. Vocational re-training is conducted with the aim of providing additional knowledge, skills and abilities, and includes studies of individual academic disciplines, technical sections and new technologies required to perform new type of professional activities within the students' existing vocational education scope. Vocational re-training to acquire an additional qualification is conducted by completing additional vocational education programs, particularly those based on international experience. 2. Career advancement activities are organized with the aim of improving the specialists' professional knowledge, improving their business qualities and updating their theoretical knowledge and practical skills to meet the higher requirements to qualifications and the need to master modern solutions to dealing with professional tasks.	Russian
Decree of the Government of Kyrgyz Republic No.346 of 29 May 2012 "On approving the Regulation on chairs of higher learning institutions in Kyrgyz Republic"	1. A chair of a higher learning institution in Kyrgyz Republic (hereinafter the Chair) is an educational, methodological and scientific subdivision of a higher learning institution in Kyrgyz Republic responsible for educational, methodological and research activities, extracurricular activities of the students, training, re-training and career advancement activities for specialists with higher education, and academic personnel of the highest qualification in one or several adjacent directions or specializations.	
Decree of the Government of Kyrgyz Republic No.53 of 03 February 2004 "On approving the Regulation on the structure and implementation terms of vocational education programs in Kyrgyz Republic"	Procedure for implementing vocational education programs in higher and secondary vocational education institutions	
Decree of the Government of Kyrgyz Republic No.346 of 29 May 2012 "On approving the Regulation on Academic And Methodological Associations of higher vocational education in Kyrgyz Republic"	- defining state education standards in the area of higher vocational education in line with the current demands and global trend in education development; - providing textbooks and methodological manuals to support the higher education programs, as required by the state education standards; - increasing the quality of vocational education programs implemented in higher learning institutions; - design of draft study plans and tentative	

	(recommended) disciplines; - determining the list of disciplines for each University component and their content for each block of general vocational and special disciplines, as well as specialization disciplines for all directions and specializations assigned by the Ministry of Education; - determining the sequence of disciplines in draft study plans, and the list of literature needed, laboratory and practical works; - conducting analysis of the supply of methodological literature for the study process and building future plans for publishing the necessary textbooks and study manuals; - developing recommendations and proposals for improving the study process, education curricula, training methodologies and technologies.	
Decree of the Government of Kyrgyz Republic No.201 of 23 March 2012 "On strategic development areas of the education system in Kyrgyz Republic" (approved the Concept for Development of Education in Kyrgyz Republic for up to 2020)	This Concept is the basis for developing the education system, identifying values and priorities and creating the basis for specific steps in the development of the education system based on Kyrgyzstan's international obligations. Transformations related to higher education system: 1. Higher and post-graduate vocational education shall ensure development of human resources willing and able to work in the realities of the labor market and meeting the educational requests of every person. Integration of science and education creates an innovative potential for progressive development of vocational education system for the benefit of an economy based on knowledge and modern technology. In this regard, the key priority in the development of education at this level shall be concentrated on the issue of improving the quality of education and vocational training of the staff at Universities, considering the current demands of the economy. 2. Change the structure and content of the higher education system as follows: - organize multi-level education system (Bachelor, Master, Doctorate – PhD); - develop and implement new-generation state education standards based on competency model, which allows a graduate to be competitive in the modern world, engage employers in the development of qualification requirements to University graduates; 3. Rebuild the study process organization and change the educational environment: - ensure flexibility and variability of individual education paths for students, expand academic mobility by introducing the European Credit Transfer and Accumulation System (ECTS); - widely implement innovative education methods, including those based on information technology; - improve material support of vocational education	

	institutions, including creation and development of comprehensive information and communication support systems for support of education process, and new-generation electronic education resources.	
Decree of the Government of Kyrgyz Republic No.201 of 23 March 2012 "On strategic development areas of the education system in Kyrgyz Republic" (approved the Education Development Strategy in Kyrgyz Republic for 2012-2020)	The Education Development Strategy in Kyrgyz Republic for 2012-2020 (SDE-2020) is based on the vision and goals of the country's development, while meeting the global Millennium Development Goals and Education for All programs. Executive bodies in the area of education responsible for implementation will shape an education policy based on the priorities laid out in SDE-2020, with continuous implementation of nation-wide measures for improving the quality of education in Kyrgyz Republic in 2012-2020. Development of labor skills in accordance with the current requirements of the labor market and demands of the population for meeting its needs and interests. Creating conditions for lifelong continuous education. Developing social partnership at all levels in the education system and active involvement of the employers in the education process.	Russian
Decree of the Government of Kyrgyz Republic No.100 of 02 March 2016 "On amendments to the Decree of the Government of Kyrgyz Republic No.201 of 23 March 2012 On strategic development areas of the education system in Kyrgyz Republic"	ACTION PLAN For implementation of the Education Development Strategy in Kyrgyz Republic for 2016-2017 as a two-year implementation plan of the Education Development Strategy for 2012-2020 Goal: Creating the basis of results-oriented education and gradual transition to education for sustainable development.	Russian
National Sustainable Development Strategy of the Kyrgyz Republic for 2013-2017	- Bridging the gap between the structure of vocational education programs and the demands of the labor market, which requires active involvement of employers in the development of new education standards, evaluating the graduates' qualifications, building centers for certification and acknowledgement of qualifications; - Filling the gap between training staff in the higher vocational education system and the labor market, which requires training of human resources on the basis of analyzing country priorities and economic strategies of the region	Kyrgyz / Russian

2.1.2. Universities offering education programs in the area of food quality and safety

Kyrgyz State University named after I. Razzakov was established in 1954 with the status of a higher education institution. KSTU is currently the largest educational and research center in Kyrgyzstan training and re-training specialists and conducting research in 77 technical, engineering and economic specializations. KSTU owns innovative technologies and implements advanced educational programs. Currently KSTU operates 8 faculties, one of which is the Faculty of Technology. The Faculty of Technology originally started as the Chair of Food Products of the Mechanical and Technological

Faculty, training engineers with the following specializations: “Meat and Meat Products Technology”, “Milk and Dairy Products Technology”, “Canning Technology”. In 1958, the Chair was transformed into the Faculty of Technology. This marked the beginning of an active development phase, with expansion of the range of education services provided and launch of new directions and specializations highly demanded for the development of the country’s food industry. Today the Faculty of Technology is more than 1300 students, including foreign students from Kazakhstan, Russia, Uzbekistan and Turkmenistan; 10 chairs and two research institutes. Following the Regulation on organizing education process on the basis of the European Credit Transfer and Accumulation System (ECTS) passed by the KSTU Academic Council (No.10 of 30 May 2012, approved by Rector’s Order of 12 June 2012), the chairs started training Bachelor and Master’s degree students for the respective directions and specializations for the chairs.

The project will involve the Canning Technology Chair (study plan direction: ***700600*** *– Standardization, Certification and Metrology; Profile and program: Standardization and certification of food products)*

The Canning Technology Chair started training bachelor’s and master’s degree students for all directions of the chair’s operation.
The chair trains specialists with master’s and bachelor’s degrees for food industry, as well as for organizations, standardization agencies and companies importing food products, with the following specifications and directions:

1. **740100** – Technology and production of food products from plant materials

Profile: Canning and Food Concentrates Technology;
Fermentation production and wine-making technology.

2. **700600** – Standardization, Certification and Metrology;

Profile: Standardization and certification of food products.

3. **580300** – Commerce;

Profile: Merchandizing and expert examination of goods.

And Master’s degree students in the following directions:

1. **740100** – Technology and production of food products from plant materials
   Program: Canning and Food Concentrates Technology.
2. **700600** – Standardization, Certification and Metrology.

The academic and teaching staff as of the beginning of the academic year is 9.75 FTEs (full-time equivalents); the Faculty staff is 13 persons, including:
6 candidates of sciences; 4 senior teachers; 3 teachers.

Kyrgyz Economics University (KEU) Founded in 1953 as Frunze Technical School of Soviet Trade (FTST). Later renamed to Bishkek Technical School of Soviet Trade (BTST), then in 1991, as part of a nationwide experiment, BTST was transformed into Bishkek College of Commerce (BCC). In 1997, Bishkek College of Commerce was granted the status of a higher learning institution – Bishkek Higher College of Commerce (BHCC). In December 1999, the college acquired the status of an Institute and was renamed to Bishkek State Institute of Economics and Commerce (BSIEC). On December 9, 2003, the institution was granted the status of a University and renamed to Bishkek State University of Economics and Entrepreneurship (BSUEE). Finally, on October 30, 2007, the institution was renamed to Kyrgyz Economics University (KEU).
The University is currently training 4000 students in Bachelor’s, Master’s and college study programs. The education process engages 300 academic and teaching staff, including 29 Doctors of Science and Professors, 59 Candidates of Science, etc. KEU have 13 departments: Economic Theory and World Economy department; Finance and Credit department; Accounting, analysis and audit department; Tourism, hospitality and entrepreneurship department; Applied information technology department; Merchandizing; expert examination of goods department; Mathematics and natural sciences department; State and official language department; Foreign languages department; Philosophy and the humanities department; Economics, management and marketing department; Banking and insurance department. KEU closely cooperates with foreign higher learning institutions from Latvia,

Lithuania, Germany, Czech Republic, Scotland, Romania, Turkey, etc., and with many Universities in the Commonwealth of Independent States (CIS).

2.1.3. Existing study programs (at all levels)

KSTU named after I. Razzakov, Faculty of Technology, Canning Technology Chair operates training programs related to quality management and safety assessment of food products (particularly for quality and safety of food products), related to safety of food products.

2.1.3.1. Bachelor's degree study

Name of the study program (KSTU named after I. Razzakov)	***Direction: 700600 – Standardizations, certification and metrology*** ***Program: Standardization and certification of food products*** *Academic degree: Bachelor* *Standard training duration: 4 years* *Form of study: credit-based*
Area	*Quality and safety management in production and sale of food materials and food products*
Content	*The content of the study program includes teaching professional activities in the subject area, for food enterprises, state agencies responsible for food industry, higher learning institutions, and research institutions. The program includes a description of the services and forms of professional activities, general requirements to the Bachelor, expected results, conditions and methods for implementing the study process.* *An evaluation of the quality of specialists trained in these areas is conducted. The study program also includes a study plan, standards, subjects and other materials ensuring high quality of training and programs for educational and production internships, a calendar of classes and study materials for implementing the respective education technology.*
Implementation methodology (duration, training modules, etc.)	*Program duration is 4 years. The program is built using modular approach.* *The total duration of the higher vocational education program for the Bachelor's degree is 240 credits. The total duration of the program for each academic year is at least 60 credits, 30 credits per semester. One credit is an equivalent of 30 academic hours.* *Internships equal 15 credits total, including 5 credits of practical studies, 5 credits of production practice and 5 credits of pre-degree internship.* *The final state attestation, including preparation and presentation of thesis paper – 15 credits.* *7 to 8 weeks of vacations are provided.* *The disciplines related to production technology, quality and safety management of food products account for the following credits:* - *Chemistry – 4 credits;* - *Microbiology – 4 credits;* - *Nutritional chemistry and nutritional supplements – 4 credits;* - *Biochemistry – 4 credits;* - *Instrumental and express control methods – 5 credits;* - *Metrology – 6 credits;* - *Identification and counterfeiting food products – 5 credits;* - *Quality management at food enterprises – 5 credits;* - *Technology and organization of food production – 6 credits;* - *Basics of technical regulation, metrology and compliance*

	assessment – 4 credits; - *Safety of food materials and food products – 4 credits;* - *Certification – 6 credits;* - *Accreditation system – 4 credits;* - *Quality management systems – 6 credits*
How is program quality assessed?	*The quality of the study program is evaluated by the State Service for Education Quality, following the procedures stipulated in the education institution's license and accreditation terms.* *The University has an Education Quality Management Department, which regularly performs internal quality control activities based on the strategy of constantly improving the quality of educational programs. It also monitors the students' academic progress.*

2.1.3.2 Master's degree study

Name of the study program (KSTU named after I. Razzakov)	***Direction: 700600 – Standardizations, certification and metrology*** ***Program: Standardization and certification of food products*** *Academic degree: Master* *Standard training duration: 2 years* *Form of study: intramural, credit-based*
Area	*Quality and safety management in production and sale of food materials and food products*
Content	*The content of the study program includes teaching professional activities in the subject area, for food enterprises, state agencies responsible for food industry, higher learning institutions, and research institutions. The program includes a description of the services and forms of professional activities, general requirements to the Bachelor, expected results, conditions and methods for implementing the study process.* *An evaluation of the quality of specialists trained in these areas is conducted. The study program also includes a study plan, standards, subjects and other materials ensuring high quality of training and programs for educational and production internships, a calendar of classes and study materials for implementing the respective education technology.*
Implementation methodology (duration, training modules, etc.)	*Program duration is 2 years.* *The total duration of the higher vocational education program for Bachelor's degree is 120 credits (3600 academic hours). Study modules amount to 80 credits, internships – 20 credits, state attestation – 20 credits.* *The disciplines related to production technology, quality and safety management of food products account for the following credits:* – *Quality and safety management systems for food products – 5 credits;* – *Basics of academic research and legislative metrology – 5 credits;* – *Food epidemiology – 5 credits;* – *Compliance assessment of food products – 5 credits;* – *Modern issues of quality and safety management of food products – 5 credits;* – *Organization and technology of testing the quality and safety of food products – 5 credits*
How is program quality	*The quality of the study program is evaluated by the State Service*

assessed?	*for Education Quality, following the procedures stipulated in the education institution's license and accreditation terms.* *The University has an Education Quality Management Department, which regularly performs internal quality control activities based on the strategy of constantly improving the quality of educational programs. It also monitors the students' academic progress.*

Kyrgyz Economic University (KEU)

The University offers study programs at specialist, Bachelor and Master levels, related to food production technology, quality and safety issues of food products.

Name of the study program	*Bachelor's degree studies, direction – Commerce, profile –* ***Restaurant Business and Service***
Area	*Restaurant business*
Content	*Implementation of the main education program of higher vocational education (HVE) is governed by the State Education Standard for HVE and the following documents:* ▪ *Study curriculum;* ▪ *Working plans;* ▪ *Teaching materials for individual disciplines and internship programs;* ▪ *Programs and requirements to final state attestation of the graduates;* ▪ *Education quality monitoring techniques (mid-term and semester-end knowledge control, testing results, etc.).* *Bachelor degree students in "Restaurant Business and Service" profile learn a number of disciplines related to food industry: Basics of microbiology; Food chemistry and safety of food products; Basics of sanitation and hygiene; Methods of quality control; Quality management; Public catering technology; Basics of technical regulation, metrology and compliance assessment.*
Implementation methodology (duration, training modules, etc.)	*Program duration – 4 years.* *The total duration of the higher vocational education program for the bachelor's degree is 240 credits. The total duration of the program for each academic year is at least 60 credits, 30 credits per semester. One credit is an equivalent of 30 academic hours.* *Internships equal 12 credits total, including 2 credits of practical studies, 4 credits of production practice and 6 credits of pre-degree internship.* *The final state attestation, including preparation and presentation of thesis paper – 10 credits.* *7 to 8 weeks of vacations are provided.* *The disciplines related to production technology, quality and safety management of food products account for the following credits:* - *Basics of microbiology – 3 credits;* - *Nutritional chemistry and nutritional supplements – 3 credits;* - *Basics of sanitation and hygiene – 3 credits;* - *Quality control methods – 3 credits;* - *Quality management – 5 credits;* - *Public catering technology – 9 credits;* - *Basics of technical regulation, metrology and compliance assessment – 6 credits.*
How is program quality assessed?	*The quality of the study program is evaluated by:* *- completing different forms of internships stipulated by the study plan at profile organizations (restaurants, cafés, etc.);*

	- monitoring the students' competencies during mid-term and final attestations; *- state final attestation (preparation of thesis paper);* *- completing licensing and accreditation of educational activities;* *- monitoring of the graduates' employment.*
Name of the study program	*Bachelor's degree studies, direction – Commerce, profile –* ***Customs Examination***
Area	*Merchandizing and Goods Examination*
Content	*Implementation of the main education program of higher vocational education (HVE) is governed by the State Education Standard for HVE and the following documents:* ▪ *Study curriculum;* ▪ *Working plans;* ▪ *Teaching materials for individual disciplines and internship programs;* ▪ *Programs and requirements to final state attestation of the graduates;* ▪ *Education quality monitoring techniques (mid-term and semester-end knowledge control, testing results, etc.).* *Bachelor's degree students in "Customs Examination" profile learn a number of disciplines related to food industry: Merchandizing and customs examination of food products; Identification and counterfeiting food products; Basics of microbiology; Quality control methods; Quality management; Basics of technical regulation, metrology and compliance assessment.*
Implementation methodology (duration, training modules, etc.)	*Program duration – 4 years.* *The total duration of the higher vocational education program for the bachelor's degree is 240 credits. The total duration of the program for each academic year is at least 60 credits, 30 credits per semester. One credit is an equivalent of 30 academic hours.* *Internships equal 12 credits total, including 2 credits of practical studies, 4 credits of production practice and 6 credits of pre-degree internship.* *The final state attestation, including preparation and presentation of thesis paper – 10 credits.* *7 to 8 weeks of vacations are provided.* *The disciplines related to production technology, quality and safety management of food products account for the following credits:* - *Basics of microbiology – 3 credits;* - *Merchandizing and customs examination of food products – 6 credits;* - *Identification and counterfeiting food products – 4 credits;* - *Quality control methods – 3 credits;* - *Quality management – 5 credits;* - *Public catering technology – 9 credits;* - *Basics of technical regulation, metrology and compliance assessment – 6 credits.*
How is program quality assessed?	*The quality of the study program is evaluated by:* *- completing different forms of internships stipulated by the study plan at profile organizations (restaurants, cafés, etc.);* *- monitoring the students' competencies during mid-term and final attestations;* *- state final attestation (preparation of thesis paper);* *- completing licensing and accreditation of educational activities;* *- monitoring of the graduates' employment.*
Name of the study program	*Bachelor's degree studies, direction – Commerce, profile –*

	Merchandizing and Goods Examination
Area	*Merchandizing and Goods Examination*
Content	*Implementation of the main education program of higher vocational education (HVE) is governed by the State Education Standard for HVE and the following documents:* ▪ *Study curriculum;* ▪ *Working plans;* ▪ *Teaching materials for individual disciplines and internship programs;* ▪ *Programs and requirements to final state attestation of the graduates;* ▪ *Education quality monitoring techniques (mid-term and semester-end knowledge control, testing results, etc.).* *Bachelor degree students in "Merchandizing and Goods Examination" profile learn a number of disciplines related to food industry: Merchandizing and examination of food products; Identification and counterfeiting food products; Nutritional chemistry; Modern quality control methods; Quality management; Basics of technical regulation, metrology and compliance assessment; Certification of quality management systems for goods and services.*
Implementation methodology (duration, training modules, etc.)	*Program duration – 4 years.* *The total duration of the higher vocational education program for the bachelor's degree is 240 credits. The total duration of the program for each academic year is at least 60 credits, 30 credits per semester. One credit is an equivalent of 30 academic hours.* *Internships equal 12 credits total, including 2 credits of practical studies, 4 credits of production practice and 6 credits of pre-degree internship.* *The final state attestation, including preparation and presentation of thesis paper – 10 credits.* *7 to 8 weeks of vacations are provided.* *The disciplines related to production technology, quality and safety management of food products account for the following credits:* - *Nutritional chemistry – 3 credits;* - *Merchandizing and examination of food products – 6 credits;* - *Identification and counterfeiting food products – 4 credits;* - *Modern quality control methods – 4 credits;* - *Quality management – 6 credits;* - *Basics of technical regulation, metrology and compliance assessment – 4 credits;* - *Certification of quality management systems for goods and services – 6 credits.*
How is program quality assessed?	*The quality of the study program is evaluated by:* *- completing different forms of internships stipulated by the study plan at profile organizations (restaurants, cafés, etc.);* *- monitoring the students' competencies during mid-term and final attestations;* *- state final attestation (preparation of thesis paper);* *- completing licensing and accreditation of educational activities;* *- monitoring of the graduates' employment.*

Name of the study program	***Master's degree studies, direction – Commerce***
Area	*Commerce*
Content	*Implementation of the main education program of higher vocational*

	education (HVE) is governed by the State Education Standard for HVE and the following documents: ▪ *Study curriculum;* ▪ *Working plans;* ▪ *Teaching materials for individual disciplines and internship programs;* ▪ *Programs and requirements to final state attestation of the graduates;* ▪ *Education quality monitoring techniques (mid-term and semester-end knowledge control, testing results, etc.).* *Master's degree students in "Commerce" direction learn a number of disciplines related to food industry: Customs control of exported and imported products; Product information and its compliance to WTO, ISO, EEU requirements; Identification and counterfeiting of consumer goods and materials.*
Implementation methodology (duration, training modules, etc.)	*The standard duration of the higher vocational education program for master's degree students in direction 580300, "Commerce", based on full-time secondary general or secondary vocational education is at least 6 years; based on higher vocational education confirmed by the academic degree of a Bachelor – at least 2 years. The total volume of the education program is 120 credits (3600 academic hours).* *The disciplines related to production technology, quality and safety management of food products account for the following credits:* – *Customs control of exported and imported products – 4 credits (120 academic hours);* – *Product information and its compliance to WTO, ISO, EEU requirements – 4 credits (120 academic hours);* – *Identification and counterfeiting of consumer goods and materials – 6 credits (180 academic hours).*
How is program quality assessed?	*Study program quality assessment includes current, interim and final state attestation.* *Databases of evaluation methods are created for attestation of students and graduates. The databases include typical exercises, control works, tests, etc., which allow evaluating the knowledge, skills and competencies acquired. Databases of evaluation methods are developed and approved by the University.* *The quality of education program is assessed during licensing and accreditation of educational activities.*

2.1.4. Existing material and technical facilities

Existing University labs that are accessible in practice are currently used to conduct studies and research in areas representing food technologies (particularly with regards to safety and quality of food products).

Name of equipment/lab	Operating features (what type of measurement can be provided)	What University has the equipment
Lab equipment at Canning Technology chair		
Sartorius YWT03 stone table for scales	For installing scales	KSTU named after I. Razzakov
Miele G7893 lab dishwasher	For washing lab utensils	
Lab steam chamber	For sterilization	
Incubator		

Name of equipment/lab	Operating features (what type of measurement can be provided)	What University has the equipment
Cabins for sensory analysis		
KERN ALS 120-4N analytical scales	For weighing	
KERN PLS 310-3F lab scales	For weighing	
Acidity meter + Hygrometer	For identifying moisture content	
LactoFlash automatic milk analyzer	For identifying fat content	
Gerber GD100MS20 water bath for butyrometers	For fat extraction	
OHAUS FD6 batch weigher	For weighing	
Versatile lab blender	For fragmenting substances to be studied	
GerberFunke butyrometer for cheese	For identifying fat content	
GerberFunke butyrometer for milk	For identifying fat content	
Lactodensimeter 6600	For identifying milk density	
NOVUS 300 mm desiccator	For cooling	
MT SevenMulti S40k desktop pH-meter	For identifying acidity	
MT FiveGo FG2Kit portable pH-meter	For identifying acidity	
Alcohol meter	For identifying alcohol content	
Binder ED-400 drying oven	For drying	
Bellingham+Stanley RFM732 digital refractometer	For identifying dry matter content	
VWR TR 300 trinocular microscope	For studying microorganisms	
Inox AC-L8 distiller	For producing distilled water	
OHAUS MB23 moisture analyzer	For identifying moisture content	
Industrial training line for milk processing	For processing milk	
Industrial training line for meat processing	For processing meat	
Industrial training line for flour processing	For processing flour	
Industrial training line for fruit and vegetable processing	For processing fruit and vegetables	
KEU, Institute of Commerce, Merchandizing and Restaurant Business Merchandizing, Product Examination and Technology Chair		Kyrgyz Economic University (KEU)
Food Production Technology lab		
Refrigerator	For storing food products	
Electric ovens	For thermal treatment of food products	
Electronic scales	For weighing food products	
Meat grinder	For grinding meat	
Coffee brewer	For brewing coffee	
Mixer	For whipping cream	
Deep-frying machine	For frying	
Microwave oven	For microwave treatment of food products, thawing food products; for sterilization of lab utensils	
Physical and Chemical Analysis of Food Products lab		
Densitometer for milk	For identifying milk density	

Name of equipment/lab	Operating features (what type of measurement can be provided)	What University has the equipment
Analytical scales	For weighing materials	
Electronic scales	For weighing materials	
Distiller	For demineralizing water	
Magnifying glass	For magnifying images	
Muffle kiln	For identifying ash content in food products	
Zhuravlev Apparatus	For measuring bread porosity	
Drying oven	For identifying moisture content in products by drying method	
Thermometer	For identifying temperature of products	
FEK-56 photoelectric calorimeter	For identifying chemical composition of products	
Refractometer	For identifying sugar content in products	
Chemical utensils	For conducting laboratory experiments	
Chemicals	For conducting chemical reactions	

2.1.5. Education background and minimum knowledge level students need to pursue education

Kyrgyz State University named after I. Razzakov

What a student must know:
- Basic issues of specific food microbiology and nutritional chemistry;
- Food production technology;
- Hygiene in food production;
- Safety of food materials and food products;
- Methods and instruments of testing food materials and food products;
- Assessing conformance of food materials and food products;
- Key principles of establishing and running food quality and safety systems for food products;
- Principles of producing safe food products, creating the conditions for safe production;
- International legislation regulating production and ensuring safety of food products;
- Domestic legislation regulating production and ensuring safety of food products;

What a student must possess:
- Knowledge of physical, chemical, technological and microbiological properties of inputs and products;
- Skills to operate equipment and devices required to perform tests and control quality of inputs, prefabricated products and finished products;
- Knowledge of standards and regulations containing domestic, intergovernmental and international conditions related to safety and quality of food products;
- Ability to organize control of compliance with hygienic norms in food production, to perform independent minimum epidemiological studies.

2.1.5.2. Master's Degree studies

Kyrgyz State University named after I. Razzakov

What a student must know:
- Basic issues of specific food microbiology and nutritional chemistry;
- Food production technology;
- Hygiene in food production;
- Safety of food materials and food products;
- Food epidemiology;
- Methods and instruments of testing food materials and food products;

- Key principles of establishing and running food quality and safety management systems for food products and ensuring quality control;
- Instruments and methods for operating a food quality management system at various stages of product lifecycle;
- Legislative and regulatory basis related to safety of food products;
- Requirements of international standards to safety management system for food products; key terms, principles and requirements of the safety management system for food products; terms used in the ISO 22000:2005 international standard;
- Modern practice of relationships between suppliers and customers in the area of quality of food products.

What a student must possess:
- Methodology of research, physical, chemical, technological, microbiological studies of food materials and food products;
- Knowledge and skills on developing, implementing and improving food safety management system based on ISO 22000:2005 requirements;
- Theoretical and practical knowledge of development and implementation of HACCP system;
- Practical skills for applying statistical quality control methods;
- Analysis of the production conditions, conducting assessment of reject rate, analyzing the reasons behind reject products appearing; developing proposals for prevention and elimination of rejects and improving the products.
- Applying principles of quality and safety management of food products in the company's commercial operations.

Kyrgyz Economic University (KEU)

Master's degree studies

Students can study the following specializations in the direction of Commerce:
- Commerce, profiles: Restaurant Business and Service; Merchandizing and Product Examination; Customs Examination.

The students must know basic regulatory documents, global environmental issues, methods and instruments of state regulation and control of professional activities, etc.
The students must be able to: work with standards when accepting incoming goods or releasing goods into sales; build product lines; assess quality, consider factors affecting and preserving quality of the products; get merchandizing information on the product characteristics from the marking and shipment documents.
The students must master: methods of evaluating the conformance of the products to regulatory requirements; methods to assess conformance; skills of working with products of different purposes, with regulatory and technical documents to assess conformance with the mandatory requirements.

Bachelor's degree studies

To get higher vocational education with an academic degree of a Bachelor, the students must complete secondary general education or secondary vocational (or higher vocational) education program and receive a government-issue document certifying the completion of secondary (full) general education, secondary vocational education or higher vocational education.

2.2. ANALYSIS OF THE ENVIRONMENT FOR PRODUCTION OF FOOD PRODUCTS AND PROCESSING INDUSTRY

2.2.1. Legislative and regulatory documents governing and regulating the production and processing of food products, including implementation of GLOBAL GAP and HACCP standards

Document name	Relation to the project (what needs to be considered when designing and implementing the project)	In English and/or Russian
The Law of Kyrgyz Republic on Public Healthcare, No.99 of 6 July 2016	Article 9 describes safety of food products and nutrition.	Russian
The Law of Kyrgyz Republic on the Procedure of Inspecting Entrepreneurial Agents, No.41 of 14 April 2016	Describes regular inspections for compliance with the production, storage, transportation and sale rules of food products.	Russian
The Law of Kyrgyz Republic on prevention of Iodine Deficiency Disorders, as amended by the Law No.113 of 25 July 2005 No.113	Describes the procedure for imports and sales of edible salt and cattle sault to the territory of Kyrgyz Republic	Russian
The Law of Kyrgyz Republic on Amending the Law on Enrichment of Baking Flour, No.54 of 12 March 2015	Describes the process and procedures of state control over safety and quality of enriched flour	Russian
The Law of Kyrgyz Republic on Veterinary Care No.175 of 30 December 2014	The Law describes legal, social, organizational, financial and economic basics of veterinary care and is aimed at protecting the population against diseases common for humans and animals; ensures epizootic well-being and veterinary safety in the Kyrgyz Republic.	Russian
The Law on Development of Agriculture in the Kyrgyz Republic No.166 of 10 April 2009	One of the key goals of this law is to ensure veterinary, sanitary and phytosanitary security, and train personnel for agricultural industry.	Russian
Decree of the Government of Kyrgyz Republic No.702 of 27 September 2006, "REGULATION on the Procedure of State Inspection"	The Decree sets the procedure for performing state oversight of compliance with mandatory requirements to products circulating in the territory of the Kyrgyz Republic.	Russian
Decree approving regulatory documents of Kyrgyz Republic in the area of public healthcare No.225 of 16 May 2011	Preventing the occurrence and spread of infections and professional diseases among workers whose activities are related to production, storage, transportation and sale of food products and drinking water.y	Russian
Decree Approving the Code of Trading Rules in the Kyrgyz Republic No.118 of 2 March 2010	The Code describes rules of trading in the Kyrgyz Republic (listing requirements to ensure quality and safety of food products).	Russian
The Law of Kyrgyz Republic "Technical Regulation on Production Hygiene of Food Products" No.88 of 1 June 2013	Article 20. Control over production operations: manufacturers producing food products shall ensure production control over compliance with the requirements of this Technical Regulation at each step of the production and technological process, based on Hazard Analysis and Critical Control Points (HACCP) system or food safety management system.	Russian
Technical Regulation of the Customs Union TR CU 033/2013 "On Safety of	***Kyrgyzstan officially became an EEU member in 2015.*** List of optional standards which ensure	Russian

Milk and Dairy Products"	compliance with the requirements of Customs Union Technical Regulation "On Safety of Milk and Dairy Products" (TR CU 033-2013)	
Technical Regulation of the Customs Union TR CU 034/2013 "On Safety of Meat and Meat Products"	List of optional standards which ensure compliance with the requirements of Customs Union Technical Regulation "On Safety of Meat and Meat Products" (TR CU 034-2013)	Russian
Technical Regulation of the Customs Union TR CU 021/2011 "On Safety of Food Products"	Requirements to food products: production, storage, transportation, sales and disposal processes.	Russian
Technical Regulation of the Customs Union TR CU 022/2011 "On Marking of Food Products"	Requirements to marking of food products.	Russian
Technical Regulation of the Customs Union TR CU 023/2011 "Technical Regulations for fruit and vegetable juice products"	Requirements to production, storage transportation and sale of juice products.	Russian
Technical Regulation of the Customs Union TR CU 024/2011 "Technical Regulations for Fat and Oil Products"	Requirements to safety and rules for production, marking, market circulation, storage, transportation, sales and disposal of fat and oil products".	Russian
SanPin 2.3.2.1324-03 "Hygienic requirements to shelf life and storage conditions of food products"	Epidemiological rules and regulations. Hygienic requirements to shelf life and storage conditions of food products.	Russian
SanPiN 2.3.2.1078-01 "Hygienic requirements to safety and nutritional value of food products"	Hygienic requirements regarding safety and nutritional value of food products, requirements to maintaining the norms when producing, importing and selling food products in operations related to production, imports and circulation of food products, providing services in the area of trading in food products and public catering services.	Russian
SanPiN 2.1.4.1074-01 "Drinking water. Hygienic requirements to the quality of water in central drinking water supply systems. Quality control. Hygienic requirements to ensuring safety of hot water supply systems.	Sanitary and epidemiological rules, regulations and requirements to the quality of drinking water; rules for controlling the quality of drinking water.	Russian
Technical Regulation of the Customs Union TR CU 005/2011 "On Packaging Safety"	Requirements to packaging and related requirements to storage, transportation and recycling processes, with the aim of protecting human life and health, property, environment, life and health of animals and plants.	Russian
Technical Regulation of the Customs Union TR CU 029/2012 "Safety requirements for food additives, flavorings and auxiliary technological materials"	Requirements to content and application of food additives, flavorings, and auxiliary technological materials.	Russian

2.2.2. Number and profiles of legal entities (state-owned and private companies) demanding specialists in the area of food safety and quality

The Law of Kyrgyz Republic enacting Technical Regulation on Production Hygiene of Food Products (No.88 of June 1, 2013) came into effect on June 11, 2014. The Technical Regulation states that all manufacturers of food products must ensure food safety by implementing a mandatory control system based on HACCP principles. Implementing the food safety management system would enable Kyrgyz companies to actively grow the confidence and trust in the food products they produce.
A business implementing a food safety management system demonstrates predictability of its internal production processes. An efficient management system helps prevent unsafe products and beverages from reaching the consumers. As per Article 10 of the Technical Regulation of the Customs Union 021/2011 "On Food Safety", "all manufacturers of food products, in the process of production of food products, shall develop, implement and maintain procedures based on HACCP principles. This way, enterprises using HACCP principles can gain a major advantage in entering foreign markets with their products.

316 large and medium enterprises (legal entities) are engaged in the production of food products, including beverages. Breakdown by specific product looks as follows:
Production:

- Meat and meat products – 20;
- Processing and canning of fruit and vegetables – 25;
- Vegetable oils and fats – 5;
- Dairy products – 45;
- Flour and cereal products – 35;
- Bread – 48;
- Dried bread and cookies – 7;
- Sugar – 5;
- Chocolate, confectionery – 5;
- Pasta – 6;
- Tea – 3;
- Distilled alcohol beverages – 17;
- Ethyl alcohol – 4;
- Wine – 16;
- Beer – 11;
- Mineral water and soft beverages – 44;
- Tobacco goods – 4.

Besides, the National Statistics Committee of the Kyrgyz Republic states that the number of economic agents engaged in production of food products, including beverages and tobacco goods, equals **8588 individual entrepreneurs as of 01 January 2014.**

2.2.3. Stakeholders: companies and institutions in need of highly skilled human resources

The entire national institutional system tasked with ensuring the safety of agricultural and food products needs high-quality personnel.
Specific organizations include:

- Ministry of Agriculture and Melioration, represented by its structural units;
- Ministry of Healthcare, represented by its structural units;
- State Inspection for Veterinary and Phytosanitary safety under the Government of Kyrgyz Republic;
- Ministry of Economy, represented by its structural units;
- Operators in the value chain for food products and importers of agricultural and food products;
- Conformance assessment authorities.

2.2.4. Characteristics of the production environment and requirements

2.2.4.1. Requirements to quality and safety of food production (meat, milk, eggs, fruit and vegetables)

Requirements to quality and safety of food production are regulated by the following Technical Regulation:

TR CU 021/2011 on Safety of Food Products – mechanisms regulating the processes ensuring safety of food products

1. Legal entities and individual entrepreneurs engaged in manufacturing food products, are subject to state registration (Articles 31-37 of the TR). State registration of enterprises producing certain food products takes the form of licensing, i.e. it requires a preliminary inspection of the specific enterprise; others require a simple notification-based registration.

2. Special food products (baby food, diabetic prevention and treatment food, athletes' nutrition, products for pregnant and breastfeeding mothers, nutritional supplements, natural mineral waters for therapeutic and diet purposes (Articles 24-26 of the TR), and new types of food products (Articles 27-29) require mandatory licensing.

3. Manufacturing of food products must be accompanied by development, implementation and maintenance of a mandatory production control system based on HACCP principles (Articles 10, 11 of the TR). More detail is provided in TR CU 021/2011 "On Safety of Food Products".

4. The manufacturer of food products must declare the conformance of goods produced to the Technical Regulation requirements at its own effort, using either its own evidence or engaging an accredited testing lab (Article 23 of the TR). Special food products that have passed state registration are exempt from the declaration requirement.

5. Veterinary and sanitary examination with the issuance of veterinary certificates at all stages of animal products circulation has been cancelled, except for examination of home-made materials and products of animal origin (Article 30 of the TR).

2.2.4.2. List of chemical substances permitted in food production (meat, milk, eggs, fruit and vegetables)

The list of chemical substances permitted in food production is regulated by the respective Technical Regulations and Sanitary Rules (SanPiN). This includes SanPiN 2.3.2.1290-03 "Hygienic requirements to production and circulation of nutritional supplements".

2.2.4.3. Production and processing control system

Production and processing control system is regulated by the following Sanitary Rules and Regulations (SanPiN):

- SanPiN 2.1.2.2645-10 "Sanitary and epidemiological requirements to housing conditions in residential buildings and premises";
- SanPiN 2.2.1/2.1.1.1278-03 "Hygiene requirements to natural, artificial and mixed lighting in residential and public buildings";
- SanPiN 2.2.4.548-96 "Hygiene requirements to microclimate at production facilities";
- SanPiN 2.2.4/2.1.8.562-96 "Noise levels at workplaces, residential and public buildings and residential development areas";
- SanPiN 2.1.7.1322-03 «Hygiene requirements to disposal and decontamination of production and consumer waste";
- SanPiN 3.5.2.1376-03 "Sanitary and epidemiological requirements to organization and performance of insect control activities against synanthropic arthropods";
- SanPiN 3.5.1378-03 "Sanitary and epidemiological requirements to organization and performance of disinfection operations";
- SanPiN 3238-85 of 27.03.1985 «Sanitary rules for enterprises in meat processing industry";

- SanPiN 4261-87 “Veterinary and sanitation rules for poultry processing and egg producing enterprises (facilities)”.

2.2.4.4. Key issues with quality and safety of processing food products (meat, milk, eggs, fruit and vegetables)

In accordance with the new Regulations on food products in Kyrgyzstan, their delivery to the domestic market shall be accompanied by declaration of conformance, which was introduced in place of mandatory certification. The key requirement for a producer to declare conformance is to perform production control on the basis of HACCP system, which includes a testing of all mandatory product features at an accredited laboratory. This is the biggest issue in Kyrgyz Republic today.

Most of the food enterprises in Kyrgyzstan are not ready to implement HACCP for the following reasons:

First, operators in food business are generally not aware about this system. There has been no regular action to improve their knowledge and skills on HACCP application.

Second, enterprises do not have laboratories of their own and no opportunity to get regular lab services from third parties to perform HACCP-based production control. There are 20 accredited labs in the country belonging to the Central Department and three labs operated by regional testing and certification centers (TCC) of the Center for Standardization and Metrology. However, these labs have limited accreditation area. Even the best-equipped labs of the Central Department and Bishkek TCC do not allow food industry enterprises to make declarations of conformance based solely on the tests conducted by Kyrgyz laboratories.

2.3. AREAS AND PROFESSIONS WHERE UNIVERSITY GRADUATES CAN WORK AFTER COMPLETING THE STUDIES

Kyrgyz State University named after I. Razzakov

Area and activities	Professions and positions
Department of Technical Regulation under the Ministry of Economy of Kyrgyz Republic (MEKR)	– Expert on food quality – Expert on HACCP
Center for Standardization and Metrology under the Ministry of Economy of Kyrgyz Republic	– Specialist on standardization – Specialist on metrology – Lead specialist for compliance assessment – Specialist on food inputs and food products examination – Expert on HACCP
Chamber of Commerce and Industry	– Expert on food quality
- fruit and vegetable canning factories, wineries	– Head of food products safety group – QC engineer
Food industry enterprises: dairy processing, meat processing, oil and fat processing factories	– Head of food products safety group – QC engineer
Consultancy companies	Auditor on food safety management systems

Kyrgyz Economics University (KEU)

Area and activities	Professions and positions
Restaurant business and service sector: - Restaurants, cafes and other catering outlets; - Retail enterprises; - Food processing enterprises;	Restaurant owners, founders of restaurants and other catering outlets; Director, Deputy Director, Manager at restaurants and other catering outlets; QC controller for public catering services;

- Hospitality and tourism industry;	Operations director at a catering outlet; etc.
Customs examination, Merchandizing and Goods Examination: - State Customs Service; - Chamber of Commerce and Industry, KyrgyzExpert Department; - Kyrgyz Accreditation Center; - National Institute for Standardization and Metrology; - Retail enterprises; - Food processing enterprises	Specialist on merchandizing and expert examination of food products; quality and safety control lab assistant; Specialist of the Quality Management Systems Department; Specialist of the Standardization Department, research lab assistant; Commercial director, Deputy Director, retail enterprise manager, expert on goods quality, etc.; Commercial director, QC controller, supplies department specialist, sales department specialist, warehousing specialist, etc.

2.4. IDENTIFYING GAPS IN KNOWLEDGE, SKILLS AND ABILITIES NEEDED

Areas	Comments
Lack of theoretical knowledge and practical skills in students regarding quality and safety of food products, testing and analyzing inputs and food products, quality and safety management of food products. Key indicators of the quality, safety and hygiene of food products: 1. Organoleptic qualities (taste, smell, color, look, texture); 2. Physical and chemical properties characterizing nutritional value of the products and their composition (dry matter and moisture contents, fat content, salt content, acidity, purity, density, viscosity, temperature stability, etc.); 3. Chemical safety (content of toxic substances, dioxins, antibiotics, pesticides, nitrates, herbicides, hormones); 4. Radiation safety (content of radioactive nuclides); 5. Biological safety (general contamination, pathogenic and conditionally pathogenic microorganisms, E.coli bacteria, mould and yeast, as well as new species of contaminants).	This is due to the fact that research labs are not equipped with modern laboratory equipment to control the quality of food products; for this reason, current studies are mostly of theoretical nature.
Lack of knowledge on: – food technology; – hygiene at food enterprises; – expert examination on the quality and safety of food products; – testing and analysis of food inputs and food products; – quality and safety management in food products.	Due to the lack of modern lab equipment for evaluating the quality of food products; insufficient time spent teaching some disciplines (both theory and practice) related to safety of food products; lack of methodological materials.
Lack of practical knowledge in the students on conducting hygienic evaluation and related issues on the safety of food products.	Due to the lack of modern lab equipment for evaluating the quality of food products.

2.5. AVAILABLE SOURCES CONTAINING INFORMATION ON THE CURRENT STATUS OF QUALITY AND SAFETY IN FOOD INDUSTRY

Report name	Relation to the project (what needs to be considered when designing and implementing the project)	In English and/or Russian
Quarterly and annual newsletters and standardization catalog of the Kyrgyz Republic. Publications by the National Statistics Committee of the Kyrgyz Republic "Small and Medium Entrepreneurship in the Kyrgyz Republic"	Studies and analysis of the sources and literature give an idea of the output of Kyrgyz industry, statistical data and processing volumes for various types of products, changes by years, etc.	Russian
Kyrgyz Republic information newsletter on food safety and poverty	Key action areas for implementing food safety measures; prospects and trends in the development of food production	Russian
Russian magazine: "Means to Assess Compliance", "Partners and Competitors", "Management: the ISO Horizons", "The World of Standards", "Standards and Quality", "Food Industry", "Food ingredients: inputs and additives", "Means to Assess Compliance", ''Quality Management Methods''	Information on quality and safety management of food products, methods and tools to manage food safety.	Russian
Food and Processing Industry Development Program Of Kyrgyz Republic for 2017-2021 (Section "Impact of Climate Change on Safety of Food Products")	Stipulates measures ensuring quality of food products in compliance with the TR CU (Technical Regulations of the Customs Union)	Russian

CONCLUSIONS (Tajikistan and Kyrgyzstan)

The global community has created numerous methods and approaches to enforce quality and safety of food products at the producer level. Various international standards help ensure quality and safety of food at all stages in the production process.

Agriculture currently uses hundreds of pesticides of chemical and biological origin. Many of them end up in the inputs, then in food products. While increasing the production output, one should not forget about food quality and safety.

Speaking about food safety, the first issue to mind is the implementation of universally accepted international food safety management systems and standards in the region.

Food safety is more than an issue of food hygiene and toxicology; it affects such areas of life in the country as food industry, exports, agriculture, commerce and logistics. Food safety control is related to both economic (production and trading) and political (the country's food security) aspects.

Thus, food safety shall be ensured through its entire lifecycle (suppliers of the means of production, farmers, consolidators, processors, transportation companies, exporters): from growing plant products, through production and transportation to storage and finally sale.

Modern market conditions call for strict production control conducted by farmers and processors of food products, determining prospective risks of pollution to the final products and state oversight over food safety throughout the value chain.

Due to major challenges faced by the society in the area of food safety, the implementation of bachelor's and master's degree programs intended to train specialists in this area is extremely important for the two countries (Tajikistan and Kyrgyzstan). In the short run, the newly trained specialists can be of help in developing and implementing safety measures, both at the finished product level and in the process of its production, thus improving the competitiveness of local producers at the domestic and foreign markets.

Each stage of the vocational education system shall produce specialists of highest qualifications, meeting the requirements of the domestic and regional labor markets.

Higher and post-graduate vocational education system must support development of human resources willing and able to work in the current labor market realities.

The main priority in developing the education level would be to focus on the issue of improving the quality of education and professional training of the specialists at Universities, considering the current requirements of the country's economy and the region in general.

This requires:

a) changing the way higher education is provided:

- establish closer ties between Universities and employers, gradually transition to training specialists under employers' orders;

b) modifying the structure and content of higher education:

- organize a multi-level education structure (Bachelor, Master, Doctorate/PhD);
- develop and implement new-generation state education standards, which enable the graduates to be competitive in the modern world while engaging the employers in the development of qualification requirements to the graduates;

c) review the organization of the studying process and change the educational environment:

- widely implement innovative education methods, including those using information technologies;
- improve material and technical support of vocational educational institutions, including establishment and development of complex information and communication systems supporting the education process, new-generation electronic education resources;

d) improving the internal and external quality control mechanisms;

- implement and enforce internal control mechanisms and modern methods for monitoring the study process and controlling the results of education;
- improve the career advancement courses for managerial and academic staff of educational institutions;
- improve the licensing and state attestation/accreditation of higher learning institutions;

e) changing the role of science

Integration between higher education and science shall take place by building research and entrepreneurship platforms as a means to share experience between food processing SMEs, research institutions and representatives of related industries. Overall, the goal of this platform is to liquidate the gap between science and business.

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