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European trends in providing food safety in training of technology students in conditions of the development of digital technologies

N S Limareva, T S Shaltumaev, T V Shchedrina, V N Orobinskaya

FSAEI HE (Branch) "North Caucasus Federal University" in Pyatigorsk, the city of Pyatigorsk

orobinskaya.val@yandex.ru

Abstract. The article deals with the problems associated with the use of European experience in ensuring the safety of consumers of food products. The need to ensure the safety of consumers is an urgent modern task for the food industry. Search and analytical work were carried out to identify the main regulatory documents regulating the quality and safety of products and services in catering enterprises in the Russian Federation and abroad. The article presents some results of Erasmus+ Jean Monnet Module grant realisation on development of educational module "Food Safety Regulation in the European Union" for students of 19.03.04 "Production Technology and Organisation of Public Catering". The module includes the study of some aspects of the European and Customs Union legislation in the field of food safety. The necessity of training future technologists of public catering with the use of distance education technologies is substantiated.

Introduction

The new direction outlined by the President of the Russian Federation Vladimir Putin in his address to the Federal Assembly on December 4, 2014, the National Technology Initiative (NTI) FoodNet (system of personal production and delivery of food and water) is one of the priorities of state policy. When forming the FoodNet roadmap, special attention is paid to ensuring the quality and safety of food raw materials and food products.

One of the fundamental tasks of this direction is to provide consumers with high-quality food products. The lack of systematic control in this area of production associated with the presence of a large number of small businesses and small forms of innovative enterprises in the Russian Federation, leading to negative consequences for the consumer and for the food producer. [1]

For this reason, much attention is paid to food safety.

Safety control in the EU countries is regulated by national sanitary and hygienic standards. Taking into account the globalisation processes in order to improve mutual understanding, simplify procedures in the field of management and trade in the world community, it is necessary to develop a generally accepted model of the food security system. [2]

The study of international experience in the implementation of food technology quality systems based on the principles of HACCP (Hazard Analysis Critical Control Point), to create a modern corporate culture of production and sales of products, not only leads to improved food safety for human health, but also to a significant increase in the efficiency and productivity of processes. [3,5]

In order to ensure a unified approach to assessing the implementation of risk analysis at all stages of the life cycle of food products for manufacturers, distributors and persons performing the functions of foreign manufacturers of food products in Russia, standards regulating the safety of food products, similar to international standards ISO 22000 are developed. [4]

Methods and discussion



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Search and analytical work were carried out to identify the main regulatory documents regulating the quality and safety of products and services in catering enterprises in the Russian Federation and abroad. (table 1)

Table 1. The main regulatory documents regulating the quality and safety of products and services in catering

The name of the document	Brief description	Application
GOST R ISO 22000-2007 "Food Safety Management Systems. Requirements for Organisations Involved in the Food Chain". [6]	This standard is identical to the international standard ISO 22000: 2005 "Food safety management systems - Requirements for any organization in the food chain". [6]	This standard is intended for organisations (enterprises) in the field of food industry, developing and implementing a system of management of food safety based on the requirements of GOST R ISO 22000. [7]
GOST R 54762-2011 / ISO / TS22002-1:2009 "Prerequisite programs on food safety - Part 1: Food manufacturing". [8]	This standard is identical to the international document ISO / TS 22002-1:2009 "Prerequisite programs on food safety - Part 1: Food manufacturing". [8]	Establishes requirements for organisations that are involved in the chain of food production. [8]
ISO 22000: 2018 "Food safety management systems. Requirements for all organisations in the food production and consumption chain". [9]	A new version of the standard was developed by the International Organization for Standardization ISO instead of ISO 22000:2005. The transition period for enterprises certified according to the international standard is 3 years from the date of its publication. [9]	As in the previous version of 2005, the requirements of the new document are system-wide and can be applied to all organisations in the food chain, regardless of their type, complexity and size. [9]
GOST R 53755-2009 - "Food safety management systems". Requirements for bodies providing audit and certification of food safety management systems" - analogue of ISO / TS 22003: 2007. [10]	This standard is identical to the international standard ISO / TU 22003: 2007 "Food safety management systems. ISO, carrying out audit and certification of food safety management systems" (ISO/TS 22003:2007 "Food safety management systems - requirements for bodies that carry out audit and certification of food safety management systems"). [10]	This standard is designed to assist in the certification of SMBPS that meet the requirements of ISO 22000 "Food safety management system. Requirements for all organisations in the food production and consumption chain". The content of this standard may also be used to assist in the certification of SMBS, which are based on other specified requirements. [10]
GOST R 51705.1-2001 "Quality Systems. Food quality management based on HACCP principles. General requirements" [11]	This standard establishes the basic requirements for the system of food quality and safety management based on the principles of HACCP - Hazard Analysis and Critical Control Points, as set out in the Directive of the Council of the European Community 93/43. [11]	This standard can be applied to all organisations, regardless of their size or complexity, that participate in the food production chain and intend to implement a program of mandatory measures for food safety in such a way as to meet the requirements set out in section 7 of ISO 22000:2005. [11]
GOST R 55889-2013. "Catering service. Food and catering safety management system" Recommendations for use GOST R ISO 22000-2007 for the food industry.	This standard is developed taking into account the main regulations of the British profile BIP 2127: 2007 "Catering services - development of recommendations for the use of ISO 22000 for the food industry", NEQ). [12]	This standard is intended for organisations (enterprises) in the field of the food industry, developing and implementing a system of food safety management based on the requirements of GOST R ISO 22000, as well as for

[12]		personnel responsible for the safety of food products. [12]
GOST R 57621-2017 "Trade Services. Sale of perishable food products through vending machines. Requirements" [13]	The standard establishes requirements for the sale of perishable food products through vending machines, including hygienic, which create conditions for the sale of perishable food products through vending machines by self-service in accordance with the rules of sale. The document for the first time defines the requirements for the operation, cleaning and disinfection of vending machines into which perishable food products are loaded, and also contains special requirements for cooling and storage of food products. [13]	The developed standard is identical to the German national standard DIN 10527: 2004 . In order to select the best practices of standardisation in this area, a large amount of information was analysed, including European, German and English standards, and detailed requirements for trading services using vending machines were identified in the German version. [13]
GOST R 54762-2011 . "Prerequisite programmes on food safety - Part 1: Food manufacturing". [14]	This standard is identical to the international document ISO/TS 22002-1:2009 "Prerequisite programmes on food safety - Part 1: Food manufacturing"). [14]	This standard establishes requirements for the development, implementation and enforcement of mandatory preliminary programs (PRP)* to assist in the management of food safety risks. [14]
GOST R 56746-2015/ISO/TS 22002-2:2013 "Prerequisite programmes on food safety - Part 2: Catering", IDT). [15]	This standard is identical to the international document ISO/TS 22002-2:2013 "Prerequisite programmes on food safety - Part 2: Catering", IDT). [15]	This standard does not duplicate the requirements of ISO 22000 and is intended to be used in conjunction with ISO 22000 in the development, implementation and maintenance of PRP programs for specific organisations, as well as for the control of basic hygiene requirements in the provision of catering services. [15]
GOST 30390-2013 "Catering service. Public catering products sold to the population. General specifications" [16]	This standard establishes general technical requirements for catering products sold to the public, including the classification of products, general requirements for the safety of catering products and safety procedures, acceptance rules, control methods, requirements for the sale of products, packaging, labelling, conformity assessment of catering products. [16]	The provisions of this standard are applied to products manufactured and sold by catering enterprises (food enterprises) of various forms of ownership and individual entrepreneurs. [16]
GOST 30389-2013 . "Catering service. Public catering enterprises. Classification and general requirements". [17]	This standard establishes the general requirements and classification of enterprises (objects) of public catering of various types. [17]	This standard is applied to enterprises (objects) of catering legal entities and individual entrepreneurs. [17]
GOST 30524-2013 . "Catering service. Personnel requirements".	This standard establishes general minimum requirements for personnel of catering establishments of different types of all	The provisions of this standard can be used in the selection and placement of personnel,

[18]	legal forms and forms of ownership. [18]	certification, qualification, development of job descriptions and standards of work of personnel of catering services. [18]
Methodical recommendations MP 5.1.00096-14. [19]	Methodical approaches to the organisation of assessment of processes of production (manufacturing) of food products on the basis of HACCP principles. [19]	The materials contain approaches to assess compliance with the requirements of sanitary legislation and technical regulations of the Customs Union for producers (manufacturers) of food products based on the principles of risk management and analysis. [19]
GOST 32692-2014. "Catering services. General requirements for methods and forms of service in catering". [20]	This standard establishes the general requirements to methods and forms of service at the enterprises (objects) of public catering. [20]	The standard is intended for use by legal entities and individual entrepreneurs in the field of catering services. [20]
GOST 32691-2014. "Catering services. The procedure for the development of brand and new dishes and products in catering" [21]	This standard establishes general requirements to the procedure of the development of brand and new dishes and products at the enterprises (objects) of public catering. [21]	The standard applies to the development of branded and new dishes and products manufactured by catering enterprises (objects) of various forms of ownership, organisational and management structure and individual entrepreneurs. [21]
GOST R 54607.3-2014. "Catering services. Methods of laboratory control of public catering products. Part 3. Methods of control of production of public catering observance of processes". [22]	This standard is applied to methods of monitoring of compliance with the processes of catering products manufacturing. [22]	This standard includes methods for controlling the quality of deep-fried fats, a method for determining the efficiency of heat treatment of meat and fish culinary products, a method for determining the mass fraction of residual sulfur dioxide in semi-finished products from sulfited raw peeled potatoes, a method for determining the content of eggs in culinary products. [22]
GOST R 55323-2012. "Catering services. Identification of catering products. Generalities" [23]	This standard is applied to products manufactured at the enterprises of public catering and sold in the rendering of services of public catering, and also at the enterprises of retail trade in the territory of the Russian Federation. [23]	This standard establishes the general provisions for the work and registration of the results of the identification of public catering products. [23]
GOST 31984-2012. "Catering services. General requirements" [24]	This standard establishes a list of catering services, general requirements for services, methods of assessing the quality of services. [24]	-
GOST 31989-2012. "Catering services. General requirements for primary food processing company of public catering". [25]	This standard establishes general requirements for primary food processing companies of catering. [25]	-

GOST 31986-2012. "Catering services. The method of organoleptic evaluation of the quality of food service products". [26]	This standard is applied to public catering products of mass production and establishes a method of organoleptic evaluation of its quality. [26]	-
GOST R 54609-2011. "Catering services. The nomenclature of indicators of quality of products of public catering". [27]	This standard establishes the nomenclature of indicators of quality of public catering production and the order of the choice of indicators of production quality. [27]	This standard is applied to products of public catering, manufactured by catering enterprises of various forms of ownership, organisational and management structure and individual entrepreneurs. [27]

The analysis of information on the creation and stages of formation of management systems and food safety of the world community is presented in table 2.

Table 2. Stages of creation of food safety and management system

Year	Organisation	Document	Purpose of adoption
1997	Codex Alimentarius Commission	ALINORM 97 /13A	Approval of the draft guidelines for the application of the HACCP system
1997	Codex Alimentarius Commission	ALINORM 97 /31A	Approval of the draft guidelines on the application of the HACCP system as analysed.
1997	Codex Alimentarius Commission	CAC / RCP 1-1969 , Rev . 3 (1997)	Establishing the basis for food hygiene, improving food safety through the use of an approach based on the principles of HACCP.
2001	International Organisation of Standardisation	ISO 15161:2001	Revision of the manual on the application of the HACCP system in order to detail the explanations given.
2003	Codex Alimentarius Commission	CAC / RCP 1-1969 , Rev . 4 (2003)	
2005	International Organisation of Standardisation	ISO 22000:2005	Model of food safety management system associated with hazards to the final customer at the time of consumption.
2005	International Organisation of Standardisation	ISO/TU 22004:2005	Publication of official guidelines for the application of ISO 22000: 2005

Work to create a new version of the standard in the field of food safety on the terms of integration of ISO 22000:2018 with other international standards for management systems, such as ISO 9001 "Quality Management Systems" and ISO 14001 "Environmental Management Systems" is carried out.

The new version of the standard includes 10 sections and introduces a new approach to risks as a vital concept for the food industry. The standard identifies risk at the operational level, applying HACCP principles and risk at the strategic level of the management system (business risk), by defining which the company will be able to find opportunities to achieve specific business goals. This ensures connection with the documents of the Codex Alimentarius Commission, which develops common international guidelines on food safety. [1]

Food safety involves the prevention, elimination of potential hazards that may arise at any time from the place of production and to the place of consumption of products. Since food safety hazards can be introduced at any stage of the process, each enterprise in the food supply chain must exercise appropriate risk control. In fact, food security can only be supported by the joint efforts of all parties involved: governments, producers, trade organisations, food enterprises and final customer.

In July 2018, the teachers of the Institute of Service, Tourism and Design of the North Caucasus Federal University (NCFU) won the European grant Erasmus+ Jean Monnet Module. Jean Monnet aims to increase knowledge of European integration processes through teaching, research and debate on topics related to the history, politics, economy and legislation of the European Union (EU), as well as EU relations with other regions of the world. Jean Monnet was launched in 1989 and it got its name in honour of the famous French statesman, one of the "architects" of the European Union [1]. The main goal of the program is to bring the European experience of education in the higher education system of the world. The participation of NCFU teachers in this project will give a real opportunity to develop the export potential of the Russian education system of European countries.

The Jean Monnet module is a curriculum or course in European Union research at a higher education institution. The duration of each module is at least 40 teaching hours per year. Training hours include not only the time of direct contact with the teacher in the form of traditional lectures, practical, laboratory classes and seminars, but also can be implemented in the format of distance learning. The modules can be focused on one particular discipline in European studies or be multidisciplinary. [2]

Erasmus + supports Jean Monnet modules with the aim of:

- promoting research and teaching experience for researchers, scientists and practitioners in matters relating to the European Union;
- collaborating in dissemination of research results;
- creating interest in the European Union;
- development of educational courses on a wide range of research activities in the European Union, relevant for graduates in their professional lives [2].

Module Jean Monnet reinforces and actualises teaching EU Affairs in the curriculum which still included the content associated with the EU only to a limited extent. They also provide facts and knowledge about the European Union to a wide range of students and those who are interested.

In the framework of the European grant of the September 2018 at the Department of Food Technology and Commodity Research of NCFU for students of direction of preparation 19.03.04 "Production Technology and Organisation of Public Catering" the educational module "Regulation of Food Safety in the European Union" is conducted. The developed module is focused on the formation of knowledge and skills to ensure food safety according to European standards for students, future specialists in the field of organisation of production and operation of catering. Implementation of the educational module enables students and teachers of NCFU to use the European experience in the field of food legislation, to master innovative methods of laboratory control of food safety of the European Union, which will improve the educational environment of the University through the introduction of innovative European learning technologies.

Anthropogenic factors of modern civilisation have led to a significant deterioration not only in the overall environmental situation in almost all regions of the world, but also to a change in the quality of food raw materials, food structure and food preferences of modern man. [3].

According to the Federal law "On Quality and Safety of Food Products" food safety is a state of reasonable confidence that food products under normal conditions of their use are not harmful and do not pose a threat to the health of present and future generations [4].

Safety of food raw materials and food products is evaluated by quantitative or qualitative content of anti-nutritional substances of microbiological, chemical and biological nature.

At an early stage of the European Union, the countries that made up it up had thousands of national food safety standards. EU legislators have been trying for many years to harmonise food safety standards. Currently, the attention of EU regulators is focused on food safety from the point of view of consumer health and protection of their interests in cases where there is a falsification, or the consumer cannot make an informed choice.

After the establishment of the Customs Union between the Russian Federation, Belarus and Kazakhstan, there was also a need for harmonisation of standards. The customs Union is based on compliance with the requirements that ensure quality control of the final product. Technical regulations and standards for the common economic space have been developed.

As for the European Union, it relies on preventive measures and minimisation of the risks associated with each process at each stage of the full food chain. The differences between the two systems have a significant impact on the content of legislation, including control, testing, labelling, approaches to food quality and the state's obligations to ensure safe food for consumers. The European Union is called upon to ensure the supply of safe food in the world and the standards by which these goals will be achieved.

The materials of the module compare the systems of the European and Customs Unions on food safety, which ensure the right of consumers to safe food all over the world.

The developed educational module includes the study of the following aspects of food legislation of the European and Customs Unions: requirements for food control and the method of its implementation, requirements for food quality, requirements for food labeling, new foods with related products and materials that require a special permit, food safety criteria and requirements for laboratory control.

The developed educational module is designed for 120 hours and consists of 3 disciplines, which include lectures and seminars:

1. "Food safety legislation". The discipline includes the following sections:
 - ✓ Comparative analysis of the legislation of the European Union and the Customs Union;
 - ✓ Trade networks in the world and technical regulations as an obstacle to the development of trade;
 - ✓ Management system of food control and the responsibility of government and industry.
2. "Food safety criteria and laboratory control". The discipline includes the following sections:
 - ✓ Laboratory control and food safety criteria in the European Union and the Customs Union;
 - ✓ Risk-based approach of the European Union food control system.
3. "Food additives and labelling for food safety." The discipline includes the following sections:
 - ✓ Requirements for food labelling;
 - ✓ Comparative analysis of the use of additives in food products in two systems.

The developed educational module is implemented in the educational process of the FSAEI HE "The North Caucasus Federal University" in Pyatigorsk, on the basis of modern educational technologies. Currently, the share of resource-saving technologies in education is insignificant and their implementation in the educational process is an urgent task.

Distance learning is considered from the perspective of resource saving [5]. The introduction and use of distance learning systems within the framework of resource saving can be determined from the perspective of positive aspects, as it allows to:

- ✓ reduce the cost of training (no rental costs, travel to the place of study of both students and teachers, etc.);
- ✓ reduce training time (collection, travel time);

- ✓ the participant is free to plan the time, place and duration of classes;
- ✓ conduct training of a large number of people;
- ✓ improve the quality of education through the use of modern tools, large electronic libraries, etc.
- ✓ create a single educational environment (especially relevant for corporate training) [5].

Hypertext technology and multimedia are used to organise individual educational trajectory of students. The distance course of the educational module "Regulation of Food Safety in the European Union" is based on the requirements for the structure of distance learning courses. In addition to theoretical materials, tasks for practical work and control issues, the course includes reference materials, video materials and video lectures. Completed practical tasks are sent and evaluated based on the established schedule. The course provides a system of forums for group communication and webinars to discuss various issues with the teacher.

Conclusion

Thus, the study of the European system of monitoring and safety requirements at all stages of the food chain from raw materials to consumers using digital technologies can be considered as a means of improving the level of knowledge of Russian students to ensure food security and the real prospect of increasing the competitive advantages of domestic food production enterprises.

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Food manufacturing

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