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Poltava State Agrarian Academy

**SECURITY OF THE XXI CENTURY:
NATIONAL AND GEOPOLITICAL ASPECTS**

Collective monograph

In edition I. Markina, Doctor of Sciences (Economics), Professor



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PREFACE

In the early 21st century, the world faces with cardinal transformations accompanied by changes in geopolitical configurations, integration processes and other changes that affect the state of national and geopolitical security. The events of the last decade have revealed an exacerbation of the problems of global security and the ambiguous impact of the processes of globalization on the development of different countries. Under the circumstances, the rivalry between the leading countries for redistribution of spheres of influence is stirring up and the threat of the use of force methods in sorting out differences between them is increasing. The global escalation of terrorism has become real, the flow of illegal migration and the probability of the emergence of new nuclear states are steadily increasing, and international organized crime is becoming a threat. In addition, in many countries there is an exacerbation of socio-political and socio-economic problems that are transforming into armed conflicts, the escalation of which is a real threat to international peace and stability. These and other factors have led to the fact that the potential of threats to global and national security has reached a level where, without developing a system state policy to protect national interests and appropriate mechanisms of its implementation, there may be a question of the existence of individual countries as sovereign states.

The threat of danger is an immanent, integral component of the process of civilization advancement, which has its stages, parameters and specific nature. Obviously, the problem of security in general, and national one in particular, should be objectively considered in terms of its role participation in the development process, that is, to set it up as both destructive and constructive functions (as regards the latter, it is necessary to emphasize the undeniable fact that the phenomenon of safety is based on counteraction to the phenomena of danger, the necessity of protection from which exactly stimulates the process of accelerating the search for effective mechanisms of counteraction).

The formation of new integration economic relations in Ukraine and the intensification of competition objectively force managers of all levels to change radically the spectrum of views on the processes of formation and implementation of the security management system in unstable external environment that is hard to predict. Today, the main task is to adapt not to changes in market conditions of operation, but to the speed of these changes. In this regard, there is a need to develop effective security management mechanisms that are capable of responding adequately and in due time to changes both in the internal and external environment. Therefore, this problem is being paid more attention in theoretical research works of scientists and practical activity of business entities.

Taking into account the fact that the traditional means of national and geopolitical security as a mechanism in its various models, forms, systems have reached their limits, since they do not contribute to solving the problems of globalization of the

civilization development, there is an objective need to form a paradigm of security management in the 21st century, which aims to confront destruction processes; to harmonize activities of socio-economic systems: society, organization, the state, the world. The joint monograph "The Security of the 21st Century: National and Geopolitical Aspects" is devoted to these and other problems. The progress in the development of the theory of security management on the basis of the analysis of theoretical and methodological works of scientists and the experience of skilled workers presented in the joint monograph creates opportunities for the practical use of the accumulated experience, and their implementation should become the basis for choosing the focus for further research aimed at improving the security management system at the national and international levels. In the joint monograph, considerable attention is paid to solving practical problems connected with the formation of the organizational and legal mechanism of organization of the security system in terms of globalization by developing methods, principles, levers and tools of management taking into account modern scientific approaches.

In the monograph, the research results and scientific viewpoints of the authors of different countries are presented in connection with the following aspects of security management: national security, food, environmental and biological security, economic and financial security, social security, personnel and education security, technological and energy security, information and cyber security, geopolitical security.

The authors have performed a very wide range of tasks – from the formation of conceptual principles of security management at the micro, macro and world levels to the applied aspects of management of individual components of national security.

The monograph "The Security of the 21st Century: National and Geopolitical Aspects" consists of five parts and 70 subparts, each of which is a logical consideration of the common problem.

The structure of the monograph, namely the presence of particular parts, helps to focus on the conceptual issues of the formation and development of national, economic, financial, social, food, environmental, biological, personnel, educational, technological, energy, information, geopolitical security, and problems of the maintenance of the practical process of application of the developed cases.

The joint monograph is prepared in the context of three research topics: "National security management in terms of globalization challenges: macro, micro, regional and industry levels" (State registration number 0118U005209); "Macroeconomic planning and management of the higher education system of Ukraine: philosophy and methodology" (State registration number 117U002531); "Business security: national and global aspects" (Protocol 2-19 of January 30, 2019, Information Systems Management University, Latvia), which emphasizes not only scientific but also practical focus.

The results of the research works presented in the joint monograph have a research and practice value.

The advantage of the joint monograph is the system and logic of the structure, the simplicity and accessibility of the material presentation, the presence of examples and illustrations.

We believe that the monograph will become one more step towards a scientific solution of the problems concerning the formation of an effective system of security management under trying circumstances of globalization.

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QUALITY AND SAFETY OF FOOD AS A COMPONENT OF FOOD OF SAFETY

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As you know, food safety is one of the most important components of economic safety. In legal acts, scientific literature, international documents provide definition of food safety from different points of view. In scientific literature, food safety is treated as an economic category that defines food safety. For example, at the World food conference the term «food safety» was defined as «the availability, at any time, of adequate, nutritious, varied, balanced and moderate world food stocks of basic foodstuffs in order to ensure a steady increase in food consumption and the compensation of production fluctuations and prices» [1].

This definition is also enshrined in article 2 of the Law of Ukraine «On state support to agriculture of Ukraine» [2], which stipulates that food safety is the protection of human life interests, which is expressed in guaranteeing the state of unimpeded economic access of a person to food products in order to maintain its normal life activities.

Scientists also put forward various interpretations of food safety. So, for food safety, Pylypenko K. [3] understands such a state of the economy, in which, irrespective of the world market conditions, a stable supply of people by food is in a quantity corresponding to scientifically substantiated parameters (proposal), on the one hand, and conditions are created to maintain consumption at the level of medical standards (demand) – on the other.

Nemchenko V. [4] defines food safety as an ability to provide the population by food in the conditions of limited financial and environmental capabilities of the state in accordance with scientifically subjected norms, individual characteristics of person and his solvency and price level.

In Goychuk's O. work [5] the food safety is a level of food supply to the population that guarantees socio-political stability in society, the survival and development of the nation, individuals, families, sustainable economic development.

Thus, the analysis of literary sources indicates that food safety in these works is considered as an economic category.

Also, scientists are considering the most important conditions for achieving food safety. So, the work of Pilipenko K. [3] outlines such conditions as the potential physical availability of food for each person (their availability and supply in sufficient quantities); the economic opportunity to purchase food by all social groups of the population, including the poor (the solvency of consumer demand); consumption of high quality products in quantity sufficient for rational nutrition.

According to Ulyanchenko A., Prozorova N. [6] is such conditions as: the population of the country is provided with ecologically clean, full and healthy food products of useful production according to scientifically substantiated norms, and rationality of their consumption, taking into account age, sex, working conditions, climatic conditions and national traditions.

The availability of safe food contributes to the development of the national economy, trade and tourism, food safety and safety of food, and is one of the factors of environment development.

In the context of globalization, urbanization and changes in consumer behaviour, the demand for an ever-widening range of food products is increasing. In order to meet this demand, there is an increase in the intensity and volumes of industrial production in the crop and livestock sectors, which creates both new opportunities and new threats in terms of food safety.

Taking into account the current challenges facing food manufacturers and food industry workers, there is an additional responsibility for ensuring the quality and safety of food [7].

Consequently, besides the established economic conditions of the present, the problems of quality and safety of food products are highlighted.

One of the sources of consumer satisfaction in food is cereals, among which cereals are popular. As the object of the research were oats extra flakes «The Power of Hercules» produced by Ltd. «Hercules and K» (Ukraine, Dnipro), then for conducting research it is necessary to analyse normative documents (ND) that regulate the quality and safety of these products. At present, in the territory of Ukraine, the following standards apply to the quality of flakes (Table 1).

The organoleptic method for assessing the quality of food products is based on an analysis of the perception of reality by sensory organs (vision, hearing, smell, touch and taste) without the use of measuring instruments. According to GOST 21149 [9] in oat flakes the following organoleptic parameters are checked: appearance, color, smell and taste, and consistency. The results of the research of the organoleptic parameters of oat flakes «Hercules' Power» are represent in Table 2.

Table 1

Updating of the NS on the quality and safety of flakes

Normative document	The object of standardization and the area of distribution of activities	Actualization
DSTU 4634: 2006 [8]	Concentrates for food breakfasts dry. Flakes of cereals. General technical conditions are valid in Ukraine	from 01 July 2007
GOST 21149-93 [9]	Oat flakes. The specifications are valid in Ukraine	from 01 January 1995
DSTU 4518: 2008 [10]	Food products. Labeling for consumers is valid in Ukraine	from 01 November 2008
from 01 November 2008 GOST 26791-89 [11]	Grain processing products. Packing, marking, transportation and storage is valid in Ukraine	from 01 July 1990
SanPiN 2.3.2.560-96 [12]	Hygienic requirements for the quality and safety of food raw materials and food products are valid in Ukraine	from 24 October 1996
State sanitary norms and rules [13]	Medical requirements for the quality and safety of food products and food raw materials is valid in Ukraine	from 29 December 2012
State hygiene rules and norms [14]	State hygiene rules and norms [14] Regulations of maximum levels of certain pollutants in food products is valid in Ukraine	from 13 May 2013

Table 2

Determination of organoleptic parameters of oat flakes «The Power of Hercules»

Name of the indicator	Characteristic of the indicator	
	according to DSTU 4634: 2006	example
Appearance	Thin, roasted, of various shapes, with a surface with shallow bubbling bloating	Flakes of different shapes, evenly fried with small blobs
Color	From light brown to dark brown of various shades	Flakes of different colors and shades from cream to brown
Smell	The scent is inherent in this type of product with the taste and smell of the additives used - for flakes with additives	A pleasant cereal smell
Taste		Peculiar cereal, not sour, not bitter
Consistency	The consistency crisp, not rigid	Flakes are crisp, not rigid

Thus, extra oat flakes, «Hercules Power» produced by Ltd. «Hercules and K», according to organoleptic parameters, correspond to the requirements of GOST 21149 [9].

According to GOST 21149-93 [9] in oat flakes the following physical and chemical parameters were determined: mass fraction of moisture, acidity, weldability. The results of research are presented in Table 3.

Table 3

Results of researches of physical and chemical indices of oat flake oven extra production quality produced by Ltd. «Hercules & K»

Indicator	Value		Relevance
	normative	measured	
Humidity,% not more than	12,5	11,5	corresponds
Acidity, ° not more than	5,0	4,34	corresponds
Weldability, min.	15	15	corresponds

Thus, corresponds to GOST 21149-93 [9] oat flakes extra produced by Ltd. «Hercules and K» meet the physical and chemical performance.

Food products – the most dangerous from a medical point of view source of harmful substances for a person. The main pollutants of food include a significant amount of substances of chemical nature. Such toxic elements as lead, cadmium, copper, can accumulate in the human body and cause diseases appear gradually, without pronounced symptoms. They are distinguished by high biological activity, oligodynamic action, cumulative properties, the presence of specific, including distant, effects on the body [15].

According to Tkachuk O. and Yakovets L. [16] about 90% of heavy metals, from their total incomes in agroecosystems with mineral fertilizers, accumulate in the soil. The rest can be included in the cycle and enter the crop production, and then to the person. The most widespread heavy metal, which can migrate from the soil to human body – lead, cadmium, arsenic. It is during the introduction of nitrogen fertilizers to the soil (mg / kg): lead – 174,4; copper – 201,9; zinc – 186,4; cadmium – 1,3; mercury – 0,4; and during the introduction of phosphorus (mg/kg): lead – 138,1; copper – 155,1; zinc – 1230,1; cadmium – 2,7; mercury – 4,6. These compounds accumulate in cereals and fodder crops. The most tolerant of heavy metals is winter rye, winter wheat, oats, barley.

Since grain crops are used to produce a significant amount of daily food products for Ukrainian consumers, such as cereals, flour, pasta, bakery confectionery products, the issue of their safety in the content of toxic metals remains important. Only constant control over the content of lead, cadmium, arsenic, mercury, copper, zinc in these food products can protect you from their negative effects, which often does not immediately occur, but is the result of prolonged accumulation (accumulation) of one or another compound to the body of person. The least protected category of the population needs special protection – children whose body is most affected by low-quality and harmful food products.

The most dangerous toxic element is cadmium, in relation to which it can

be said that it is a carcinogen that kills slowly. To its negative action, first of all, include damage to the central nervous system, liver and kidneys, negative effects on phosphorous-calcium metabolism and causing the destruction of bone tissue, etc. Almost inferior to cadmium for their toxicity, mercury and arsenic. Mercury is a submersible metal, if for a long time, gradually, about 200 mg, comes to the human body, one can cause of early symptoms of poisoning – a defeat of the sensory part of the nervous system, which may be accompanied by a loss of sensitivity of the skin. Also, mercury can cause hearing impairment, blindness, coordination problems. Arsenic is the most affected by the digestive and nervous systems. Copper and zinc are the micronutrients that are needed by a person for normal livelihoods, but they become dangerous when they get an excessive amount of body. In this case, they poison the human body and cause it a series of negative changes – accelerated process of aging, there is a mental retardation, etc [16].

Oat flakes can undoubtedly be called the leader when we speak about the daily breakfast of Ukrainians. The speed of cooking, a wide assortment of products with a different price, many recipes, high consuming value make them very popular in the diet of adults and children. Therefore, the research of the content of toxic metals in oat flakes is the most actuality in present.

The content of toxic elements in oat flakes should not exceed the permissible levels established by medical and biological requirements and sanitary norms of quality of food raw materials and food products. No. 5061-89 dated August 1, 1988 Sanitary regulations and norms SanPiN 2.3.2.560-96 «Hygienic requirements for quality and safety food raw materials and food products»[12].

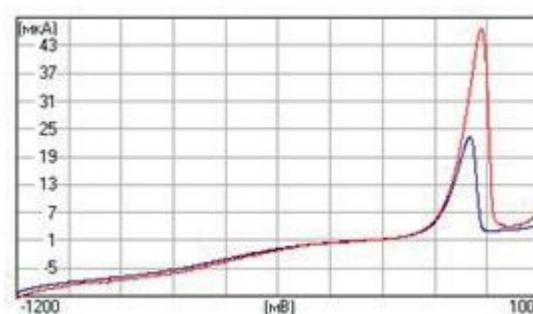


Fig. 1. Voltamperogram of the analyzed solution of flakes

Voltammetric method was used to determine the content of heavy metals in experimental samples of oat flakes based on the registration and research of the current dependence flowing through the electrolytic cell from the external superimposed voltage. Graphic representation of this dependence is called voltamperogram. At the first stage, preliminary preparation of a special solution from experimental flakes was carried out, and in the second stage – an own voltammetric research was

conducted. Voltamperogram analysis provides information on the qualitative and quantitative composition of the solution analyzed (in particular, on the content of lead, cadmium, copper) (Fig. 1).

The results of determination of the content of toxic elements in oat flakes extra «Hercules Power» produced by Ltd. «Hercules and K» are given in Table 4.

Table 4

Results of determination of the content of toxic elements in oat flakes, mg / kg

Name	Value	
	permissible levels [12]	measured
Contents: - lead	0,5	0,0758
- cadmium	0,1	0,0345
- copper	10,0	3,32

The test example is fixed 0,0758 mg/kg of lead (acceptable level – 0,5 mg/kg), 0,0345 mg/kg of cadmium (acceptable level – 0,1 mg/kg) and 3,32 mg/kg copper (acceptable level – 10,0 mg/kg). Thus, a test sample of oat flakes contains lead 6,5 times lower than acceptable level, cadmium – 2,8 times less, and copper – less than 3 times.

Consequently, the analysis of the results of the research of the content of toxic elements in the oat flakes of extra production by Ltd. «Hercules and K» showed that this food product meets the requirements of GOST 21149-93 [9] and SanPiN 2.3.2.560-96 [12] according to measured safety parameters.

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DEVELOPMENT OF THE PLANT GROWING INDUSTRY AS A PREREQUISITE FOR ENSURING FOOD SECURITY OF UKRAINE

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Plant growing plays exceptionally an important role in Ukraine's food security formation as it provides the population with food products, livestock raising with forage, food, processing and light industry -with raw materials, foreign trade - with export products. In particular, in 2017, compared to 2010, the specific weight of products of plant origin in the structure of exports of agricultural and food products increased by 12 percentage points and is 52%. At the same time 70,4% falls on grain crops, and 22,3% - seeds and fruits of oil-bearing crops [6, p. 31]. However, to date, some plant growing industries are in crisis, are low-profitable, which requires the development of measures to improve their efficiency. Under market conditions the economic instability of production is manifested not only in the productive but also in the cost component of the production efficiency. Therefore, an important place in the study of food security is the issue of economic efficiency of plant growing products production. The resolution of this issue should be carried out not only at the state but also at the regional level, where the issues of food supply to the population are solved.

Stability, productivity and efficiency as well as the level of competitiveness of an enterprise of any form of ownership are caused by the following main factors: the size of land, the level of technical and technological equipment and management. Under such conditions those entities of entrepreneurial activity, which organically combine the entrepreneurial and organizational talent of the manager with other production resources, are more effective.

The gross agricultural output in Ukraine for 2010-2017 varied, as indicated by the chain growth indices. Thus, in 2017, compared with 2016, production decreased by 3,2%, including plant growing production - by 3% [6, p. 38-39]. It should be noted that in the period from 2013 to 2017, the share of agricultural enterprises in the production of agricultural products increased from 54% to 56.4% [9, p. 47].

In the structure of the gross output of agricultural enterprises the steady predominance of crop production is 77.3%, respectively, livestock products account for 22.7% of gross output [6, p. 47].

The development of the crop sector is determined by the dynamics and structure