Contemporary Aspects of Goods` Safety

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Abstract

Goods safety is the basis of the quality of life of consumers in the modern conditions of the dynamically developing environment. Protection against risks of acquiring goods that may endanger life and health of consumers includes requirements for the general safety of the goods and the manufacturer's liability for damage caused by defective goods. The aim of the article is to present summarized up-to-date information on: legislative framework in this field in national and international aspect; factors that affect goods safety; relationship between goods safety, offered to consumers and hazards risks;control of good.

Keywords: safety, goods, consumers` protection

JEL Code: I18, Q18

Introduction

Consumers' attitudes towards goods, as a natural and unavoidable need, have changed in unison with the changing social conditions and the development of society. Proof of this is the interest that consumers worldwide show in the safety, composition and properties of goods they consume. This determines the need, on the labor market, for highly qualified specialists in the field of control of product safety and assessment of their impact on consumer health.

The protection of human health at every stage of the production process is a top priority for public health, economy and control bodies. The aim of EU product safety policy is to ensure that Union citizens consume safe and nutritious products made from qualitative raw materials, while creating optimal working conditions for industry. The common safety framework is reflected in the European General Product Safety Directive. It was adopted due to the fact that it is extremely difficult to develop legislation for any product that currently exists or could be produced in the future in the EU. In addition, the Directive is a preventive legislation, it sets out the general safety requirements for all products that could potentially appear on the market. The main objective is to ensure that goods placed on the market are safe through its implementation.

Modern eating habits of consumers, new trends in production and consumption are the cause of various diseases characteristic of the modern era, such as obesity, osteoporosis, cancer, diabetes, allergies, etc. There are other problems related to an aging population, high-energy foods and unbalanced diets. The main problems nowadays are connected with quality and safety of good offered to consumers; modern eating habits of consumers, new trends in production and consumption (Cencic, et. al., 2010). Therefore, *healthy food* has become increasingly popular in recent years among consumers. A good understanding of the role of diet and nutrients relevant to the health and immunity of the human body will facilitate their use to improve human health (Childs, et. al., 2019). Health claims regarding food suggest a link between a particular food and the fact that food can reduce the risk of disease and are based on the concept of consumer protection (Loveren, et. al., 2012).

Another current problem is related to *organic farming*, and consumer interest towards these foods is growing. Products are organic when they are labeled *"organic"*. In Bulgaria, the organic labeling of products is governed by Council Regulation № 834/2007. Organically certified foods are produced and processed in accordance with the requirements of this regulation, and in cases where there is no certificate, the products are not organic.

Functional foods are processed foods that can provide additional functional benefits to the well-being of consumers. Some functional ingredients, such as polyunsaturated, fatty acids

(PUFAs), probiotics / prebiotics / synbiotics and antioxidants are most commonly used in foods (Granato, et. al., 2020). Functional foods contain bioactive ingredients in their composition, which have a beneficial effect on the health of consumers. This group of foods includes milk, fermented milk and yogurt, kefir, etc. (Corbo, et. al., 2014; Noomhorm, et. al., 2014). The main task of a rational diet is to obtain through food enough *probiotics* and *prebiotics*, which play an important role in the health of the human digestive system. *Probiotics* are the good bacteria that live in the human body. They are useful for the body as: they break down and assimilate food; maintain overall health and ensure that the immune system works well in the human body (Azzurra, et. al., 2013). *Prebiotics* are the food for good bacteria, the main source being the indigestible fiber contained in certain foods of plant origin. Therefore, in modern conditions, a systematic approach is needed to evaluate probiotics in food, leading to the justification of health claims (Joint FAO/WHO Working Group). It has been proven that when choosing probiotic functional foods, consumers assess the health claim as the most significant and recognize them mainly by the price and brand of the product (Appels, et. al., 2016).

Ultra-processed foods are becoming more dominant, initially they are widespread in high- and middle-incomed countries. They are delicious, cheap, ready-to-eat foods. The industrial processing of these foods has a significant impact on the composition, nutritional value and health status (rapid increase in obesity and related diseases) of consumers. The global food system is considered to be transnational corporations for food production, retail and fast food services, whose business is related to ultra-processed products, many of which are offered under the form of snacks (Monteiro, et. al., 2013). According to the modern classification of NOVA (a name, not an acronym, based on the level of processing), foods offered to consumers are 4 categories: unprocessed or minimally processed foods, processed culinary components, processed foods and ultra processed foods. *Ultra-processed foods* are also considered as their modifications, obtained by adding salt, sugar and fat, as well as additives in their composition in order to improve their taste (Gibney, et. al., 2017).

The purpose of this study is to make a brief and reasoned analysis of the state of goods` safety in the EU and particularly in Bulgaria. In this regard, it is necessary to highlight the regulations that must be complied with by all producers and traders of goods in the modern dynamically developing environment, the main types of safety and safety control of goods at national level. The paper is based on a study of a large number of literature sources, clarifying the relationship between the regulatory framework, types of safety and control of products` safety. The accepted thesis is that goods` safety offered to consumers is directly related to the requirements laid down in the regulations, safety of the raw materials used for the production of the goods, the applied technology and the control of goods.

1. Legislation related to goods`safety

The globalization of good chain is constantly leading to new challenges and risks for health and interests of consumers in the EU. The main objective of EU goods safety policy is to achieve the highest level of protection of human health and consumer interests towards goods. The Union seeks to achieve this by ensuring that good is safe and properly labeled, considering diversity, including traditional products, etc. To this aim, the EU has developed a large body of food and goods safety legislation, which are constantly monitored and adapted to the new areas. This legislation is based on a risk analysis (Yonkova, et. al., 2011).

Consumer confidence in goods offered in various countries of the Union and in particular in Bulgaria is directly related to their quality and safety. It is mainly influenced by the composition of raw materials, higene of production, packaging and logistics (Kjaernes, et.al., 2006). Improving food safety is a key factor in achieving sustainable development for the industry. EU food safety policy aims to protect health throughout the 'food chain - from farm to fork', at every stage of the food production process. The basic principles of EU food safety policy are set out in the general EU

legislation. Its overall objectives are to facilitate free trade of goods throughout the EU, ensuring an equally high level of consumer protection in all EU countries. The general EU food legislation also sets out the principles for risk analysis (EFSA, 2007). The European Food Safety Authority (EFSA) carries out a risk assessment of food and feed safety. In close cooperation with national authorities and open communication with key players in the sector, EFSA provides independent scientific advice and clear communication on existing and emerging risks (Yonkova, et.al., 2011).

In Bulgarian legislation, the definition of product safety is reflected in the Consumer Protection Law and in the Food Law. According to them, a *safe good or service* is any good or service which, under normal and reasonably foreseeable conditions of use, including the duration of its use, its commissioning, installation and maintenance, does not pose a risk to the life and health of consumers or it is minimal and compatible with the use of the good or service and is considered acceptable to ensure a high level of consumer protection.

The basic principles of food safety are contained in Regulation 178/2002, which is also called the General Food Law. The regulation requires businesses to ensure that all goods, food additives and food / feed for animals can be certified backwards in the food chain that they are safe for consumers. Goods` contaminants are chemical, biological, physical or radiological in nature. Their safety should be considered in the following several areas: chemical safety, biological safety, physical safety and radiological safety. The sources of contamination of goods are most often: raw materials; equipment, personnel, premises for production and logistics of products; additives used in composition of certain goods; compaunds used in crop and livestock production. The main threats are most often due to the potential presence of additives, heavy metals, toxins and emerging food pathogens, in the composition of goods and processed foods.

2. Types of safety

The basic principles of food safety are presented at Regulation 178/2002, which requires businesses to ensure that all foods, food additives and food / feed for animals can be certified backwards in the food chain that they are safe for consumers. Good contaminants are chemical, biological, physical or radiological in nature. Their safety should be considered in the following areas: chemical safety, biological safety, physical safety and radiological safety (Figure 1) (Stefanova, 2020).

Figure 1. Tipes of Goods` Safety

Source: Own research

Chemical safety. Contaminants in goods are usually: nitrates, additives, heavy metals, pesticides, allergens, genetically modified organisms, etc. *Nitrates* are compounds that are formed naturally when nitrogen combines with oxygen or ozone. High levels of nitrate in food and drinking water can be dangerous to health, especially for infants and pregnant women. Sources of nitrate include fertilizers, animal feedlots, industrial waste, and food processing waste. Goods containing

high level of nitrates are: water, vegetables (lettuce, fresh garlic, green onions, carrots, spinach, dock, dill, red beets, red radishes, zucchini, broccoli) and meat products (sausages, smoked meats, etc.). Leafy vegetables, such as lettuce or spinach, contain the highest concentrations of nitrate (Cheung, 2020). *Additives* are substances intentionally added to goods to improve colour, flavour, keeping quality, nutritive value or physical condition (texture). The main categories of food additives (Figure 1) are *preservatives* (antimicrobial, antibrowning, antixcidant), *nutritional supplements* (vitamins and minerals), *flavoring agents* (sweetners, flavor enhancers, other flavors), *colorings* (carotenoids, green dyes, blue dyes, etc.), texturing agents (stabilizers, emulsifiers), miscellaneous (enzymes, catalyzers, solvents, prepellants). The most popular and used additives are: colorants (carbonated beverages, candies, lollipops, ice creams); preservatives (canned foods - jams, juices, canned food); antioxidants and acid regulators (lactic acid products, sweetened fruit milks, desserts, sausages, butter, chocolate); thickeners, stabilizers and emulsifiers (jam, jellies, condensed milk, chocolate desserts, dairy products); sweeteners (carbonated soft drinks, carbonated water, chewing gum, candies, diet waffles, energy drinks, fruit drinks, boza, etc.) (Welford, 2016; Güngörmüş, et. al., 2012).

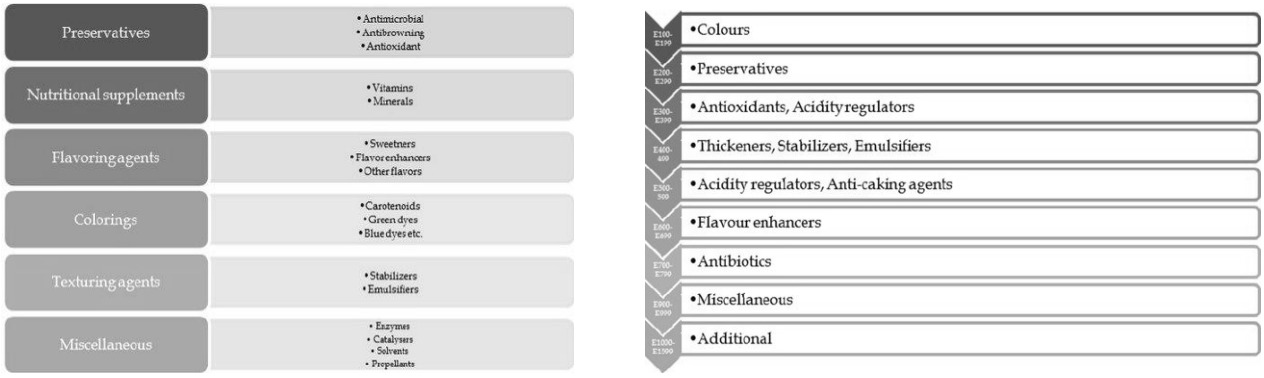

Figure 2. Main categories of food additives and their classification by numeric range

Source: (Güngörmüş, et. al., 2012)

Each food additive is assigned with a unique *E number*, which have been assessed for use within the European Union (EU) in order to inform consumers (Figure 2). *E numbers* for European countries are all prefixed by "E", on the other hand, non-European countries do not use this prefix. The numbering scheme fallows that of the International Numbering System (INS) as determined by Codex Alimentarius Committee (Codex Alimentarius, 2009). Though, only a subset of INS additives is approved for use in the EU. The United States Food and Drug Administration listed these items as *generally recognized as safe* (GRAS). As an example, additive E 341 (Tricalcium phosphate) is approved by US so has an *E prefix* and 341 numbering which stands for 340-349 subset known as *phosphates* under Antioxidants and Acidity Regulators group (Güngörmüş, et. al., 2012). *Heavy metals* (lead, cadmium, mercury, arsenic, aluminium) are most often found in high concentrations in water, plant products, in some animal organs (liver, kidneys, bone system, fur), e-cig vapor and less frequently are found in muscle tissue (meat) and fish (Johnson, 2018). *Pesticides* Regulation (EC) 396/2005 sets harmonised maximum residue levels for pesticide residues in food and feed in the European Union in order to ensure high levels of consumer protection. The analysis of notifications on pesticide residues in food, submitted in the Rapid Alert System for Food and Feed (RASFF) between 2002 and 2020, show that pesticide residues are often-concerned in vegetables (53.8%) and fruits, tree nuts (24.2%) and they are usually found in products mainly originating from third countries (82.4%) (Kuchheuser, et. al., 2022). *Allergens* are a type of antigens that are harmless to most people, but elicits an unusually strong immune response in others.

Allergens cause the immune system to synthesize immunoglobulin class E (IgE) antibodies. Worldwide, allergies are constantly increasing, mainly due to chemicalization, industrialization and environmental pollution. Allergens can be summarized into the following groups: *food:* milk, eggs, peanuts, soy, wheat, etc.; *inhalation:* grass and wood pollen, house dust, mold; *insect venom:* bees and wasps, as well as hair, feathers, skin cells of birds and animals, *household allergies:* detergents, cosmetics and others. Annex II to Regulation (EU) 1169/2011 reflects substances or products in food causing allergies or intolerances (Werfel, 1999). *Genetically modified organisms* (GMOs) – The concept of genetically modified foods is becoming increasingly popular nowadays. Consumers attitude towards GMOs is influenced by various factors, including food safety, quality, and taste (Stanton, et. al., 2021). Owing to considerable impact on technology and traditional food production. This is why the status of GMOs in agriculture and food processing is considered, their benefits and adverse effects are studied, and regulatory issues are established to achieve satisfactory traceability and respect public opinion (Peter, et. al., 2011).

Biosafety. Contaminants in goods are: bacteria, molds, toxins produced by microorganisms (mycotoxins). *Bacteria.* The temperature danger zone is the most important concept in food safety. It's between 4˚C (40˚F) and 60˚C (140˚F), this is the temperature zone in which food-borne bacteria multiplies rapidly. Within four hours in this zone, bacteria on food will likely have multiplied to dangerous levels, and should be discarded. Refrigerators need to be set below the minimum end of the scale, they should be colder than 4˚C/40˚F, to ensure that bacterial growth is kept to a minimum. Refrigerating food extends its life considerably. When being kept warm, the internal temperature of food must be above 60˚C/140˚F. Freezing food slows bacterial growth almost to a complete halt, though frozen food does not remain safe indefinitely (Canadian Food Inspection Agency; Wilde, 2018). *Molds* are dangerous to human health and a serious threat to food supply chains. They can grow on a wide range of acidic products, such as fruits or fruit juices, as well as foods with intermediate moisture content, like breads and bakery products, that many other microorganisms, such as bacteria, cannot (Dagnas et al., 2013). Mold spoilage of goods causes significant economic losses and diseases such as allergies, asthma, hypersensitivity diseases (allergic bronchopulmonary aspergillosis or allergic fungal sinusitis) (Borchers et al., 2017). *Toxins produced by microorganisms (mycotoxins)* - Mycotoxins (Patulin, Aflatoxins, Ochratoxin A, Fumonisins, Deoxynivalenol, Zearalenone, Beauvericin, Enniatins. Ergot Alkaloids, Alternaria Toxins, T-2 and HT-2 toxins) are secondary fungal metabolites. It was found that many types of different food products can be contaminated, even in different phases from the field to processing and storage. Plants are commonly considered the main hosts of fungal growth, with consequent mycotoxin contamination, while food of animal origin may contain mycotoxins because of animal feeding with contaminated products (Karlovsky et al., 2016; Suman, 2021).

Physical safety. Contaminants in the goods are: *foreign impurities* (stones, metal pieces, pieces of packaging – cardboard, etc.) – packaged cereals and legumes, sugar, salt, spices; *organic impurities* (parts of insects, pests - mites, fungi, moths, etc.) - honey, jam, canned fruits and vegetables, cereals, flour.; *migrated substances from the packaging in the composition of the goods* – goods, packaged in polymer, etc. packages (Shendurse, et. al., 2019).

Radiological safety. Contaminants in goods are: radioactive residues due to accidents, contained in food, water, feed, soil and air, such as cadmium or other potentially radioactive compounds. (Council Directive 2013/59; Appels, et. al., 2016). Radiological hazards are easily detected because they involve high levels of radiation and most of the time are related to nuclear disasters (e.g. Chernobyl and Fukushima). A lot of food producers, have to assess the risks they face of radiological hazards as part of their HACCP approach. The hazard involved in radiologically contaminated products is of course that these goods are potentially carcinogenic (can create cancer) or even mutagenic (can create cell mutations), but quite often these negative health effects only occur in the longer term and are therefore difficult to pinpoint to the ingestion of one specific food stuff (Appels, et. al., 2016).

Releases of radioactive materials into the environment have a significant effect on agricultural and food commodities. This was apparent in 1986 when the fallout of radionuclides from Chernobyl over a wide area of Europe and Asia caused serious disruptions to food production and trade with food products. These disruptions were exacerbated by the lack of: uniformity of actions taken by national authorities; preparedness to respond to such an emergency. In considering overall emergency responses to the impact of a transboundary release of radioactive materials, the basic principles of radiological protection and of good protection should be applied. Action levels established under existing principles for food contamination control, such as the FAO International Radionuclide Action Levels for Food (IRALFs) have provided the necessary consumer assurance, or the guideline levels determined by the Codex Alimentarius Commission (Randell, 2020).

In conclusion, we should summarize that the main sources of contamination of goods are most often: raw materials; equipment, personnel, premises for production and logistics of products; additives used in the composition of certain goods; compaunds used in crop and livestock production. The main threats are most often due to the potential presence of additives, heavy metals, toxins and pathogens, in the composition of products and processed foods.

3. Control of the goods` safety

According to regulatory requirements in the regulatory framework, goods are safe when: under normally foreseeable conditions of use such as long-term use, they do not pose a risk to the life and health of consumers or the risk is minimal; meet the established safety requirements (established standards at national and European level) in order to be placed on the market.

Goods` safety is ensured by their manufacturers: this is the person who produces / processes goods or a person whose trademark / distinctive mark is marked on goods. Producers of goods have the obligation to: check the conformity of the goods with the safety requirements established by law; provide information on all risks of use, including those that are not obvious in the instructions; take preventive measures to respond to risk, including withdrawing goods from the market/ suspending the service, notifying consumers of the risks identified, seizing already purchased products, etc. On their own initiative or at the request of the control authorities, they may take the following preventive measures: sampling and analysis of samples of goods placed on the market; analysis of consumer complaints; maintaining a register of complaints; informing the distributors about the measures taken to monitor the safety of goods; provide conditions for tracking the goods along the entire supply chain (indication of the name of the manufacturer, batch number, etc.). Distributors have an obligation to: not deliver goods for which they have information that does not meet the general safety requirement; provide information on the risks associated with the use of the goods; have documents necessary to trace the origin of goods; assist the manufacturer and the inspection bodies in the risk prevention measures taken by them.

Manufacturers, distributors and service providers shall cooperate with each other and assist the control authorities to prevent or eliminate the risks posed by the goods or services they provide. If any of these persons know that a product placed on the market poses a risk to the health and safety of consumers, they must immediately alert the control authorities and provide them with information, enabling the identification or tracing of the goods or consignment of goods.

The control of goods` safety at national level, provided to the consumers, is carried out by the following control bodies at national level:

- Bulgarian Food Safety Agency (BFSA) - for foodstuffs;
- The Executive Agency for Medicines - for quality, safety and efficacy of medicines;
- Regional Health Inspectorates (RHI) - for mineral / spring water and cosmetic products;
- The State Agency for Metrology and Technical Supervision - for technical products, etc .;

- The Commission for Consumer Protection (CPC) – for non-food products and coordinates the activities of the control bodies in connection with the safety of non-food goods and services, and the Ministry of Health - in connection with the safety of food and cosmetic products.

The control bodies alone or in cooperation have the right to:

- carry out a safety inspection of goods, including after their placing on the market;
- take samples of goods for safety analysis;
- order, where the product is likely to present a risk to a certain category of consumers, to warn them of the risk in a timely and appropriate manner to the manufacturer, distributor or person providing the service, including through the publication of special warnings;
- order temporary suspension of the product/service from the market for the period necessary for control, inspection and assessment of its safety;
- organize the withdrawal of the product from the market or suspension of the service, as well as warnings to consumers about the risks it contains;
- seize goods from consumers if they are dangerous;
- give a prescription to the manufacturer, distributor or the person providing the service for strengthening self-control, staff training, etc., when the conditions for production, storage and provision of services may pose a danger to the health/safety of consumers;
- close the store or temporarily suspend the activity of the manufacturer, distributor or the person providing the service in the presence of a serious risk.

In this aspect, there is a need to define the perspectives related to goods` safety. Given the theoretical statements of leading scientists in various fields of product safety, we could derive the following perspectives, taking into account changes in the environment, external and internal threats, as well as the potential of producers to anticipate and eliminate hazards, which may occur.

The perspectives related to goods` safety can be summarized in the following directions:

- Implementation by the authorities effective and systematic official control of the monitoring programs in order to ensure goods safety.;
- Application of modern methods of sampling and analysis of the levels of mycotoxins, dioxins, heavy metals, additives and nitrates, as well as the evaluation of the results of microbiological and pharmacological indicators, and for contaminants and pesticides, in order to prevent contaminated goods to reach the commercial network.

The control activities are usually connected with the establishment of safety, quality and labelling standards. These should be established on the broadest possible scale, in the recognition that goods production and marketing is truly a global industry. Goods safety can be achieved through the implementation of the main established and most widely used safety practices and standards: Good Practices, HACCP and ISO 22000, Codex Alimentarius Commission (CAC), International Featured Standard (IFS), British Retail Consortium (BRC) and their effective application on each level of the good chain. The Codex Alimentarius Commission have the main role in establishing certain food control standards. It is the role of national governments to establish uniform safety standards so that: all consumers receive equal levels of protection; all good producers are equitably treated through application of the same levels of safety; consumers are informed about the standards of protection that are being applied.

Conclusion

The following conclusions and summaries can be drawn from the conducted research of the specialized literature and practice in the field of product safety, and the reasoning made:

First: The analysis of the state of good safety in the EU and in particular in Bulgaria prove the need and scope of the European good safety policy, legislation and documents that all producers and traders of goods in the dynamically developing world must comply with, connected with contaminants of good which are most often found. The main approach taken in this direction by the EU is the measures related to the reduction of secondary contamination of good sources along the entire good chain. Good control and application of established practices during all stages of the production process - processing, logistics and sales, are essential for the availability of safe good offered to consumers in today's dynamic and competitive environment.

Second: Goods safety is guaranteed by safety management systems certified for compliance with international standards. In this context, it should be clearly stated that all contaminants in good, and in particular additives authorized for use in the EU, are controlled in order to establish their quantities and to assess the safety of the product for the consumer. For those, whom is necessary, maximum permissible levels or specific restrictions for their use in the composition of goods are established.

Third: Adherence to good practices in the production process, to European legal requirements, for the content, purity and quantities of substances permitted for use in good, proper labeling without misleading the consumer, ensures their safe use without risk to the health of consumers. Adequate labeling of products allows for an informed choice of the exact good by consumers.

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