

# State and Prospects of Ukraine's Implementation of HACCP to Implement EU Directives on Food Safety

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## Abstract

The purpose of the study is to develop recommendations for improving the organizational support of Ukraine's implementation of HACCP in the context of the implementation of EU directives on food safety. It is proved that the EU requirement for Ukraine to introduce the HACCP system by business entities in the food market eliminates barriers to the export of Ukrainian food products in the EU and US markets. It is argued that due to the fact that Ukraine has fulfilled all the formal requirements for adapting domestic legislation on the implementation of the HACCP system there was a reorientation of exporters from the CIS countries to the EU, and, as a result, the structure of exports has been improved. It is proved that in Ukraine the leaders in the implementation of the HACCP system are exporters of food products and food raw materials. It is proved that the problems of ignoring the implementation of HACCP are not uniform. This requires the use of fiscal, legal, administrative, and social and informational levers of influence on food market entities. It is proved that the application of the proposed model of organizational measures will contribute to solving the identified problems, especially if these measures are reinforced by strict sanctions for entities that offer dangerous, environmentally polluted food products to the market. Recommendations for improving organizational support for Ukraine's implementation of HACCP in the context of the implementation of EU food safety directives, unlike the existing ones, and which are a model of causally related solutions, whose the systematic implementation aimed at the emergence of a number of positive economic and social effects are developed. The application of the proposed model of organizational measures will contribute to solving the identified problems, especially if these measures are reinforced by severe penalties and decisions on revoking licenses for the right of conducting business activities by entities that offer dangerous, environmentally polluted food products to the market.

*Keywords: organizational measures, EU requirements, export, safety, food products.*

## 1. Introduction

In accordance with the association agreement between Ukraine and the EU, the export of Ukrainian food products to the EU is possible if Ukraine complies with the food safety directives. In the European Union, these requirements are implemented on the basis of the implementation of the HACCP system (HACCP is a system for analyzing risks, hazards, and controlling critical points).

In Ukraine, the introduction of the HACCP system has been discussed since the beginning of 2000s. Initially, its implementation was supposed to begin in 2005. Then the control over compliance with this requirement was entrusted to local sanitary and epidemiological control bodies. The HACCP system was to be implemented on the basis

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of one of the following alternatives: DSTU 4161 (National Standard of Ukraine), ISO 22000, FSSC 22000, IFS Food Standard, BRC Global Standard For Food Safety. But in fact, the system was never implemented. The easiest way to implement the HACCP system is based on standards DSTU 4161 [1] and ISO 22000 [2]. However, these standards do not contain specific requirements for the "preconditions program", so they are not recognized by the global food safety initiative GFSI (Global Food Safety Initiative) in the European Union. For the European Union the implemented and certified system on FSSC 22000 standard, that is, an improved version of ISO 22000 is needed.

Taking into account the fact that in 2014 the association agreement was signed between Ukraine and the EU, in particular its economic part, the conditions for import and export, as well as transit of food products are important for the Ukrainian business entities and consumers, which requires more active implementation of the HACCP system by business entities.

Since 2015, the implementation of the HACCP system in Ukraine has become mandatory for all food market subjects. Given this, this study is relevant and timely. Considering that this system has been introduced by individual domestic enterprises this year, the urgency of the problem is only increasing.

Analysing scientific literature, in particular, such works as [3-22] allows stating that quite a lot of attention is paid to the problems of implementing the HACCP system. In general, the total set of works can be divided into several groups of studying. Those that are dedicated to:

- conceptual, theoretical and methodological-applied aspects of implementing the HACCP system. Thus, the works [3-5] consider the historical stages of the development of the HACCP system, the initial positions and vectors of its formation, as well as the factors under the influence of which the HACCP system can acquire advantages or disadvantages;
- the features of the implementation of the HACCP system in relation to specific food products. This group of studies is the most numerous. Thus, for example, in the publications [6-9], the implementation of the HACCP system was investigated in relation to the production of biscuits, encapsulated products with pro biotic microorganisms, feed, ice cream and cheese;
- the features of the implementation of the HACCP for food packaging, as well as recipes and production technologies for specific food products. Studies [10-12] are devoted to the use of metal for food packaging, production of encapsulated semi-finished products with pro biotic microorganisms, the factors to ensure the efficiency of the center for collecting and processing bull semen;
- the experience in implementing the HACCP system in certain countries, industries, or specific enterprises. These problems are discussed in papers [13-20]. Thus, it is a study of the conditions for ensuring the quality and safety of products at retail enterprises, industrial enterprises for the production of alcoholic beverages and bread, the experience in implementing HACCP in the field of school nutrition, as well as in countries such as Mali, Ghana and Tunisia;
- the role of HACCP in achieving an appropriate level of consumer security. Thus, for example, studies [21-22] consider the problems of implementing HACCP to control

infections in sheep products and other food products;

- the formation of balanced systems to evaluate the performance of enterprises using the HACCP system [23-27].

Regarding the educational and methodological literature, in particular such works as [28-30], it is mainly devoted to the conceptual, methodological and methodological aspects of HACCP implementation, which are universal for all enterprises of different sectors of the food market.

As seen, the problem of implementing the HACCP system is quite deeply developed. Despite this, there are practically no studies that dealt with HACCP in the context of adaptation of food enterprises to the use of export opportunities on the market. Domestic scientists, who deal with the HACCP problem, mainly consider it as a system of consumer protection. The presented study examines the possibilities of HACCP from the point of view of obtaining positive economic effects from the growth of exports of domestic food products to the EU markets.

## 2. Materials and Methods

The paper's objective is to develop recommendations for improving the organizational support of Ukraine's implementation of HACCP in the context of the implementation of EU directives on food safety. To achieve this goal, it is necessary to do such tasks as:

- analysing EU requirements for food safety and ecology in the system of conditions of the economic part of the Association of Ukraine and the EU;
- identifying HACCP compatibility with EU requirements for Ukraine;
- identifying the level of scientific development of the problem and issues that still remain unsolved;
- analysing the current state of Ukraine's implementation of EU directives on food safety and environmental products;
- identifying trends in food exports after Ukraine signed the economic part of the association agreement with the EU;
- disclosing the essence and justification of recommendations for improving organizational support for the implementation of HACCP by Ukraine in the context of the implementation of EU food safety directives.

When analyzing the EU requirements for food safety and ecology in the system of conditions of the economic part of the Association of Ukraine and the EU, as well as for identifying the compatibility of HACCP with EU requirements for Ukraine, the provisions of modern systemology and methods of horizontal and vertical comparison are applied. The content analysis method is applied to identify the level of scientific development of the problem and issues that still remain unsolved. Methods of statistical analysis are used to analyze the current state of Ukraine's implementation of EU directives on food safety and environmental products performed by applying, and to identify trends in food exports after Ukraine signs the economic part of the association agreement with the EU. In order to disclose the essence and justification of recommendations for improving organizational support

for the Ukraine's implementation of HACCP in the context of the implementation of EU directives on food safety, process-functional and structural scientific approaches were applied, as well as the provisions of set theory, in particular the Zermelo-Frenkel Axiomatics.

### 3. Results

#### 3.1. EU requirements for food safety in the system of conditions of the economic part of the Association of Ukraine and the EU

Basically, the concept of "safety" is considered as a separate aspect, a parameter of the category "quality". Despite this, the concept of "security" is often highlighted in the regulatory documents of the EU, the United States and other countries. The reason is the increased relevance of this quality parameter for consumers.

In Table 1 shows the current system of food safety requirements in the EU. In the EU, food safety and environmental products are regulated by separate directives that relate to several sectors: technical, environmental, as well as sanitary and phytosanitary.

General technical requirements in the field of product safety are defined by Directive 2001/95 / EC of the European Parliament and of the Council of 3 December 2001. "On General Product Safety". This legislation is applied in the absence of specific rules governing the safety of certain categories of goods or if specific industry rules are insufficient. In accordance with the provisions of the Directive, a product is considered safe if, in accordance with the safety provisions laid down in European legislation or, in the absence of such regulations, subject to the national requirements of the Member State where it is sold or placed on the market. The product is also considered safe if it meets the European standard. The general procedure and conditions for placing food products on the EU market, accreditation of business entities, as well as the market surveillance mechanism are outlined in Council Regulation № 765/2008 of 9.07.2008 and Decision of the European Parliament and of the Council 768/2008 of 9 June, 2008. Environmental and phytosanitary requirements for food products supplied to the EU market contain several elements:

- control of persistent organic pollutants (the EU policy is aimed at eliminating or minimizing the use of these products in accordance with the Stockholm Convention on Persistent Organic Pollutants and the Protocol to the UNECE Regional Convention on Long-range Transboundary Air Pollution. Basic document of the EU legislation-regulation of the European Parliament and the Council of the European Union 850/2004 of 29 April, 2004.);
- requirements for plant protection products and biocides (in the EU plant protection products for placing on the market must be authorized in accordance with the provisions of the Regulation of the European Parliament and the Council 1107/2009 of 21 October, 2009. In turn, biocides (disinfectants, preservatives, non-agricultural pesticides) supplied to the EU market must meet the requirements of the EU and Council Directive 98/8/EC of 18February, 2008 and a number of the other EU legislative acts);
- requirements in the field of sanitary and phytosanitary measures (in accordance with the EU rules on official control in the field of SPS established by the EU and Council Regulation 882/2004 of 29 April, 2004, the EU and Council Regulation No. 854/2004

of 29 April, 2004 and the EU Council Directive 2000/29/EU of 8 May, 2000 defines the main requirements that are applied to plants and products of plant origin, which are imported into the EU. Goods imported into the EU customs must meet the EU sanitary and phytosanitary requirements for the protection of human and animal health.

**Table 1: The EU food safety requirements system**

Directives	Controls	Control tools
<p><i>The technical requirements</i></p> <p>Directive 2001/95/EC of the European Parliament and of the Council of 3 December, 2001 "On general product safety" [31]; Regulation of the Council of the EU № 765/2008 of 9 July, 2008 [32]; Decision of the European Parliament and of the Council № 768/2008 of 9 July, 2008 [33]; Directive 94/62 / EC of the European Parliament and of the Council of 20 December, 1994 [34].</p>	European Parliament and Council of the EU;	<ul style="list-style-type: none"> <li>- accrediting business entities;</li> <li>- product labeling;</li> <li>- functioning the monitoring and accounting systems: RAPEX (Rapid alert system for non-food products that pose a serious risk);</li> </ul>
<p><i>The environmental requirements</i></p> <p>Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (EP and Council Regulation 689/2008 of 17 June, 2008 on the export and import of dangerous chemicals) [35]; Regulation of the European Parliament and of the Council 850/2004 of 29 April, 2004 [36]; Regulation of the European Parliament and of the Council 1907/2006 of 18 December, 2006 [37]; Regulation of the European Parliament and of the Council № 1272/2008 of 16 December, 2008 [38]; Regulation of the European Parliament and of the Council № 1107/2009 of 21 October, 2009 [39]; Directives of the EP and the Council of the EU 98/8 / EC of 18 February, 2008 [40]</p>	European Parliament and Council of the EU;	EDEXIM (European database of exports and imports of hazardous chemicals); REACH (Registration, Evaluation, Authorization and Restriction of Chemicals).
<p><i>Sanitary and phytosanitary requirements</i></p> <p>Regulation of the European Commission and the Council of the European Union 882/2004 of 29 April, 2004 (control over compliance with legislation in the fields of food, feed, animal health and welfare) [41]; Regulation of the European Parliament and of the Council 854/2004 of 29 April, 2004 (special rules for the organization of official controls on products of animal origin intended for human consumption) [42]; Regulation of the European Parliament and of the Council 178/2002 (General principles and requirements of food law) [43]; Council Directive 2000/29 / EC of 8 May, 2000 [44]</p>	European Parliament and Council of the EU;  Competent authorities of the EU member states; (The European Commission and the European Food Safety Authority)	

Source: created by the authors.

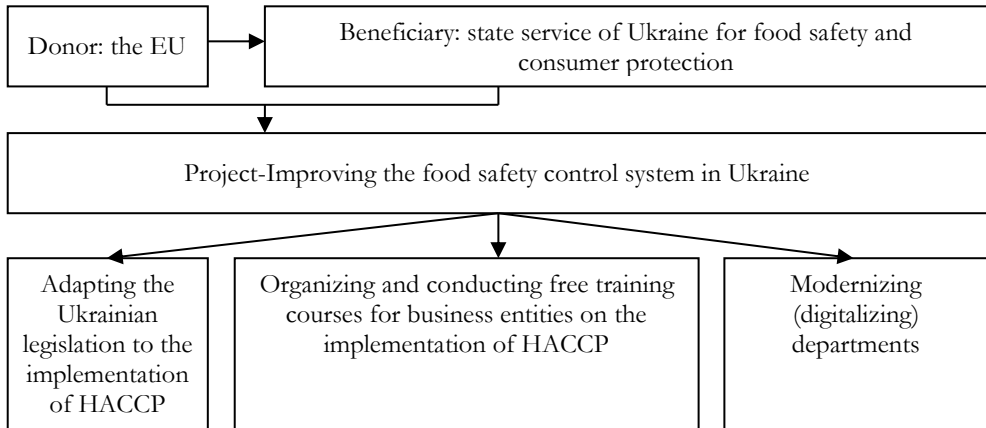
These requirements are classified in the sectors of food and feed safety, plant health, and public health. Food imported into the EU must comply with conditions which include: general principles and requirements of food law (Regulation and the EU Council Regulation 178/2002); registration by the EU importers of suppliers of products from the country of origin of goods; general rules of food hygiene and specific requirements for food hygiene of animal origin; rules on microbiological criteria for foodstuffs; rules on pesticide residues, veterinary drugs and contaminants in food; special rules for genetically modified food and feed, bioproteins and new products; special rules for certain groups of food products (mineral waters, cocoa, quick-frozen food products) and food products aimed at specific groups of the population (products for babies and children); specific marketing and labeling requirements, requirements for raw materials, feed ingredients and feeds intended for specific nutritional purposes; general rules for materials intended to come into contact with foodstuffs. In its turn, imports of animals and products of animal origin are carried out in accordance with the following rules: the exporting country must be included in the list of the countries that are allowed to export the relevant product category to the EU; products of animal origin may be imported into the territory of the EU provided that they are produced at approved processing plants in the exporting country; all imports of animals and products of animal origin must be accompanied by a health certificate issued by the official veterinary competent authority of the exporting country; each consignment is subject to inspection at a checkpoint where the EU customs border crosses.

In the EU, HACCP was implemented on the basis of the Council of Europe Food Hygiene Directive 93/43 / EC of 14 June, 1993. The provisions of the Directive stipulate that companies in the food industry are required to develop HACCP-based systems to ensure food safety. In 2004, instead of Directive 93/43 / EC, the European Parliament and the Council of Europe adopted Resolution 852/2004 "on sanitary and hygienic rules for food production" [45].

Influenced by signing the economic part of the Association Agreement between Ukraine and the EU in 2014 in Ukraine under the leadership of the State Service of Ukraine for Food Safety and Consumer Protection and with the EU support, the project "Improving the food safety control system in Ukraine" was implemented. Its goal was to adapt the norms of Ukrainian legislation and the provisions of state standards to the EU requirements for the safety of food exports to European countries.

During the implementation of the project, 11 bills and 92 by-laws were developed, which are aimed at adapting European food legislation in Ukraine. Among the existing laws - "On information for consumers about food" [46], "On safety and hygiene of feed" [47], "On state control over compliance with legislation on food, feed, animal by-products, health and animal welfare" [48] and others. Within the project, the digitalization of departments was carried out, as well as comprehensive staff training, the State Food and Consumer Service received laboratory and IT equipment, as well as software worth 2.5 million euros. Other beneficiaries – the Ministry of Agrarian Policy and food of Ukraine, the Ministry of Health, the Department of Customs Control Organization of the State Fiscal Service received funding in the amount of 3.5 million euros.

In Fig. 1 shows the organization structure of the Ukrainian market adaptation project to implementing the HACCP system.



**Figure 1: The organization structure of the Ukrainian market adaptation project to implementing the HACCP system**

*Source: created by the authors.*

In fact, at present all the formal requirements for implementing the HACCP system in Ukraine have been met. Nevertheless, there are certain factors that hinder the coverage of all food market participants in Ukraine by the HACCP system.

### 3.2. Analysis of the current state of Ukraine's implementation of the EU directives on food safety and organic food

Since in the chain of production, supply, storage and sale of food products, the EU requirements for Ukraine are reduced to the implementation of the HACCP system, the empirical data on the implementation of this system is actually an answer to the question of Ukraine's implementation of the EU directives on safety and ecological food products. Today, according to the State Food and Consumer Protection Service, more than 200 thousand enterprises in Ukraine should implement HACCP, of which almost 5,000 enterprises had to pass an audit by the end of 2020. Table 2 provides statistical data on groups of enterprises by types of economic activity that are required to implement HACCP.

According to Article 65 of the Law of Ukraine "On state control over compliance with legislation on food, feed, animal by-products, animal health and welfare" [30] in case of non-compliance with the obligation to implement on-site procedures based on principles of HACCP, the market operator should be fined in the amount of: for legal entities – 30 minimum wages; for individual entrepreneurs – 15 minimum wages.

For the first violation within the last three years, the state inspector issues an order to the market operator to eliminate the violation without drawing up a protocol. But in case of non-fulfillment or untimely fulfillment of instructions the penalty in the amount of: on legal entities – 8 minimum wages is imposed; for individual entrepreneurs – 5 minimum wages.

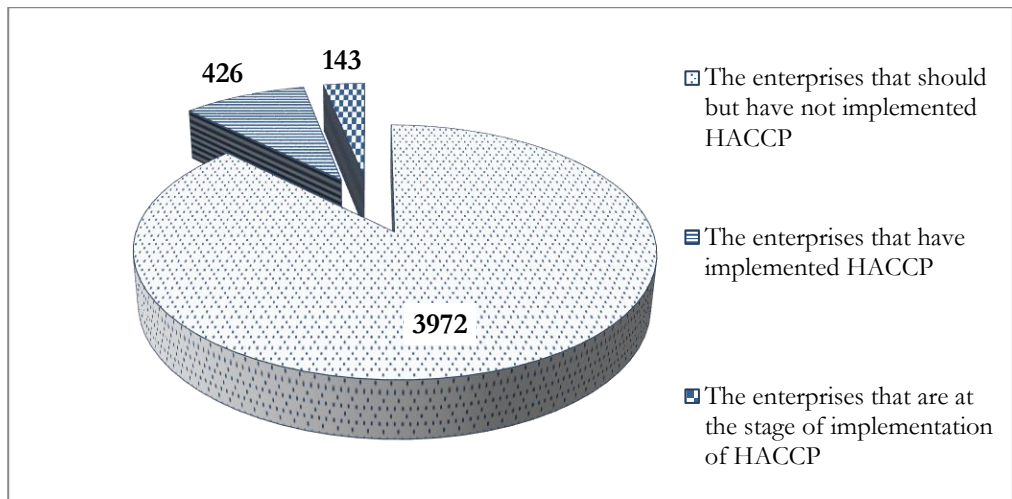
**Table 2: The number of business entities by type of economic activity**

Types of economic activity	Total, units	Including			
		enterprises		individual entrepreneurs	
		units	in % of the total number of enterprises	units	in % of the total number of individual entrepreneurs
Total	1839672	355956	100.0	1483716	100.0
including industry*	125859	44425	12.5	81434	5.5
Agriculture, Forestry and Fisheries	76328	50504	14.2	25824	1.7
wholesale and retail trade; repair of motor vehicles and motorcycles	818217	93590	26.3	724627	48.8
transport, warehousing, postal and courier services	90591	16085	4.5	74506	5.0
temporary accommodation and catering services	61761	7535	2.1	54226	3.7

Note. \* c. incl. enterprises of group C according to NACE (section 10, 11).

Source: created by the authors.

In fact, only 12.5 % of domestic food enterprises have implement or are trying to implement HACCP (Fig. 2).



**Figure 2: A share of Ukrainian enterprises that implemented the HACCP system before 20.09.2019 and were subject to audit in 2020**

Source: created by the authors.

In 2019, the Verkhovna Rada registered a draft Law of Ukraine on Amendments to Certain Legislative Acts of Ukraine Concerning the Protection of the Rights of Food



Market Operators with Low Capacities (No. 2230 of 4 October, 2019). It provides for the elimination of the obligation to implement the Hazard Analysis and Control at Critical Points (HACCP) system for food market operators with small capacity. At present, such operators are obliged to apply permanent procedures based on the principles of the HACCP system. Obviously, such a legislative initiative will not increase food exports, but it may be acceptable for companies that focus exclusively on the domestic market, although there is no such exclusivity for businesses in any country in the world that has switched to the HACCP system.

### **3.3. Trends in food exports after Ukraine signed the economic part of the association agreement with the EU**

According to the State Food and Consumer Services, almost 300 Ukrainian companies have the right to export to the European Union, of which more than 100 are food producers. Ukraine recently ranked fifth among food suppliers to the EU. Ukraine is ahead of Brazil, the United States, China and Argentina. After Ukraine, the main exporters of agricultural products to the EU are Switzerland, Turkey and Indonesia. Each of these countries exported goods to the EU for almost € 5 billion each year. In recent years, Ukrainian exporters have used 100% tariff quotas for duty-free exports to the EU markets on a range of the Ukrainian goods (honey, malt and wheat gluten, processed tomatoes, grape and apple juices, wheat, corn, butter). Domestic exporters also used additional trade preferences, in particular for corn, soft wheat, honey and processed tomatoes. This state of affairs was facilitated by the abolition of the EU duties on certain groups of goods, provided for by an association agreement with the EU. Today, the share of the European Union market in total exports of Ukraine is over 40%, in its turn, the share of food products in total domestic exports is more than 35%, of which almost 20% is accounted for by the EU. In terms of food products, the balance of payments between Ukraine and the EU is positive. Ukraine exports almost 10 types of food products to the EU, most of them to the Netherlands, Spain, Poland, Germany and Italy.

### **3.4. Recommendations for improving organizational support for the implementation of HACCP by Ukraine in the context of the implementation of the EU food safety directives**

Based on the results of examination of empirical data on the state of implementing HACCP in Ukraine, there are ambiguous circumstances. On the one hand, over the past few years, a number of consistent steps have been taken at the level of Public Administration bodies to meet the EU requirements for the implementation of HACCP. These measures mainly concerned the adaptation of Ukrainian legislation to the EU legal acts, the modernization of relevant ministries and departments, as well as the organization of awareness-raising events in the business environment. In general, this became the basis for the possibility of introducing HACCP by domestic food producers. The positive effect of the conducted work was the introduction of the HACCP system by several hundred food companies, as well as the growth of food exports to the EU countries. On the other hand, despite the fact that the legislation of Ukraine obliged all food producers to implement the HACCP system by September 20, 2019, and to meet

this requirement was provided for five years, still the lion's share of food market participants not only have implemented this system but also do not belong to those who are trying to do it. The reasons for this situation are different:

1. Most food manufacturers and other subjects of the food market in Ukraine work exclusively for the domestic consumer. They are not interested in opportunities to enter the EU markets, so these business entities are convinced that they do not need the HACCP system.
2. A significant proportion of domestic food producers work in the shadows and grossly violate not only the requirements for food safety, which are laid down in EU directives, but also in DSTU. Given this, they are extremely interested in avoiding any form of quality control of their products.
3. Among the officially registered business entities in the Ukrainian food market that own widely advertised brands, including those that are massively sold in all-Ukrainian grocery supermarket chains, there are those that deliberately violate DSTU and the EU directives to increase the shelf life of products, reduce the cost of their cost, achieve properties, uncharacteristic products that are made from natural, environmentally friendly raw materials. Therefore, this category of enterprises is not interested in implementing HACCP and is ready to pay fines stipulated by law to continue their activities on the terms that are beneficial to them.
4. Despite the fact that in all the regions of Ukraine, due to the financial support of the EU, free training seminars and other training programs are held to implement HACCP, many business entities in the food market are still not familiar with the essence of HACCP and do not know how and why to organize the implementation of this system at their enterprises.

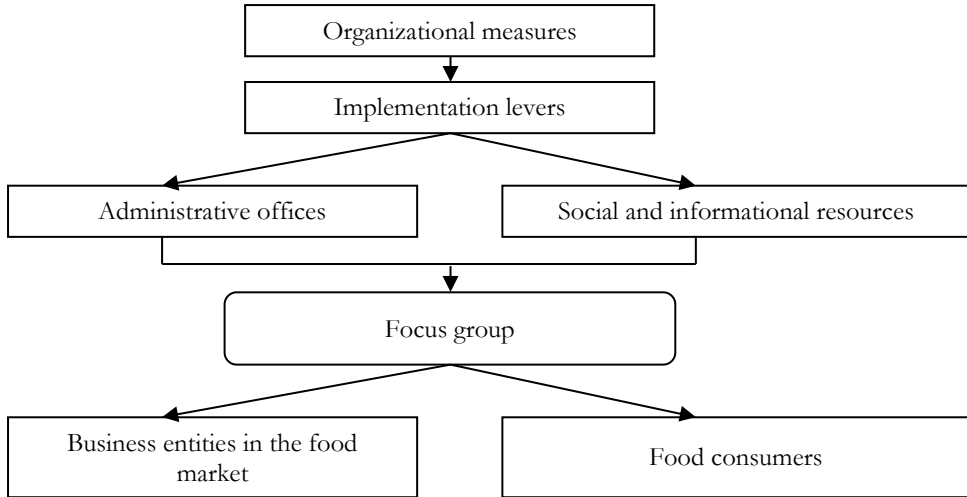
As a result, the key reasons for the low level of the implementation of HACCP by Ukrainian food producers are:

- a large share of enterprises in the total number of food market entities that operate in gross violation of food safety requirements;
- a low level of awareness of business entities in the food market about the essence and procedure of the implementation of HACCP;
- a small share of exporters in the total number of food market entities;
- a large share of enterprises operating in the shadows in the total number of food market entities.

Solving these problems requires the use of fiscal, legal, administrative, and social and informational levers of influence on food market entities. Fiscal measures should obviously be aimed primarily at reducing the level of shadowing of business activities, as well as eliminating the possibility of deliberate violation of domestic law and DSTU, but fiscal levers go beyond the scope of this study, so focus on administrative and socio-informational levers of influence, which are essentially organizational in nature (Fig. 4).

In formalized form, the proposed model of organizational measures can be written as follows:

$$\left[ \left\{ \mathbf{Z}_o \right\}_{o=1}^{a=3} \right] \mapsto \left\{ \mathbf{V}_r \right\}_{r=1}^{b=2} \supset \left( \left\{ \mathbf{A}_w \right\}_{w=1} \cup \left\{ \mathbf{S}_i \right\}_{i=1} \right) \Rightarrow \left\{ \mathbf{F}_g \right\}_{g=1}^{i=2} \supset \left( \left\{ \mathbf{C}_p \right\}_{p=1} \cup \left\{ \mathbf{Z}_r \right\}_{r=1} \right), \quad (1)$$



**Figure 4: The proposed model of organizational measures**

Source: created by the authors.

where  $\left\{ Z_o^a \right\}$  – a set of organizational measures ( $o$ ) of each of the groups ( $a$ ) that need to

be implemented for the implementation of HACCP by Ukraine in the context of the implementation of the EU food safety directives;

$\left\{ V_r^{b=2} \right\}$  – a set of levers ( $r$ ) of each group ( $b$ ) provided for the implementation of

organizational measures for the implementation of HACCP by Ukraine in the context of the implementation of EU food safety directives;

$\left\{ A_w \right\}$  – a subset of administrative levers ( $w$ );

$\left\{ S_i \right\}$  – a subset of social and information levers ( $i$ );

$\left\{ F_g^{i=2} \right\}$  – a set of food market entities ( $g$ ) of each of the groups ( $i$ ) that are targeted by

administrative and socio-informational levers of influence;

$\left\{ C_p \right\}$  – a subset of the focus group representing business entities in the food market ( $p$ );

$\left\{ Z_r \right\}$  – a subset of the focus group representing food consumers ( $r$ ).

This expression, from the point of view of process-functional and structural approaches, demonstrates the logic of relationships between the components of the proposed model. The purpose of using the levers provided by the model is to achieve the following effects:

- changes in the social responsibility of business entities for food products offered to the

market –  $\left\{ \mathbf{A}_n \right\}_{n=1} \sim \left\{ \mathbf{A}_n \right\}_z \setminus \left\{ \mathbf{A}_n \right\}_b$ , where n are signs of the expected effect; indices z, b are

the reporting and base periods;

- development of the Institute of civil society in the direction of increasing public activity and interest in countering the appearance of dangerous, environmentally dirty products on the market  $\left\{ \mathbf{B}_m \right\}_{m=1} \sim \left\{ \mathbf{B}_m \right\}_z \setminus \left\{ \mathbf{B}_m \right\}_b$  – where m are signs of the expected effect;

- establishing a permanent communication, an information platform for discussing between food producers and their consumers the problems of the appearance on the market of products that are manufactured in violation of safety indicators –  $\left\{ \mathbf{X}_q \right\}_{q=1} \sim \left\{ \mathbf{X}_q \right\}_z \setminus \left\{ \mathbf{X}_q \right\}_b$ , where q is the signs of the expected effect.

From the standpoint of set theory, the set of the above effects and the nature of the relationship between them can be written as follows:

$$\left\{ \begin{aligned} & \bigcup_{z=1}^Z \left\{ \mathbf{A}_n \right\} \cup \left\{ \mathbf{B}_m \right\} \cup \left\{ \mathbf{X}_q \right\}; \\ & n \in \bigcup_{z=1}^Z \left\{ \mathbf{A}_n \right\} \Leftrightarrow \exists \left\{ \mathbf{A}_n \right\} \in \bigcup_{z=1}^Z, n \in \left\{ \mathbf{A}_n \right\}; \\ & m \in \bigcup_{z=1}^Z \left\{ \mathbf{B}_m \right\} \Leftrightarrow \exists \left\{ \mathbf{B}_m \right\} \in \bigcup_{z=1}^Z, m \in \left\{ \mathbf{B}_m \right\}; \\ & q \in \bigcup_{z=1}^Z \left\{ \mathbf{X}_q \right\} \Leftrightarrow \exists \left\{ \mathbf{X}_q \right\} \in \bigcup_{z=1}^Z, q \in \left\{ \mathbf{X}_q \right\}, \end{aligned} \right. \quad (2)$$

where  $\bigcup_{z=1}^Z$  is the set of expected effects (Z) from the implementation of the system of

measures described by Model (1).

Achieving these goals is possible in various forms, holding thematic conferences, symposia, congresses, round tables, etc., as well as in the form of providing business entities with technical and information and consulting assistance on the implementation of HACCP. Today, some of these measures are being realized. Some of them are held on a voluntary basis, the others are organized by the state food and consumer service with the support of the EU, but judging by the situation that has developed in Ukraine around HACCP, these measures are not enough. The transition to HACCP should be more organized. If today the focus group that the State Food and Consumer Service is focused on is only business entities in the food market, then in the near future it should be expanded to include food consumers. Given this, an important measure to counteract the appearance of dangerous, low-quality food products on the market should be consumer pressure on retail establishments that sell these goods. If the fact of using low-quality, dangerous raw materials that do not comply with DSTU is recorded by the state regulatory authorities, but it still enters the market, then such products must be appropriately labeled as "DANGEROUS PRODUCT". To implement this measure, the following conditions are at least necessary:

- food products that fall on the shelves must regularly undergo commodity examination;

- commodity expertise of food products should be alternative and performed by independent certified laboratories;
  - the results of the expert examination must be public. The public and professional consumer protection organizations should be informed about dangerous environmentally contaminated food products;
  - consumer protection organizations should conduct extensive, public awareness-raising activities regarding the consequences of consuming dangerous food products.
- The result of implementing this measure should be a massive drop in demand for products that have not passed the commodity expertise, or have passed it with a dangerous result.

It is advisable to apply social, informational and administrative levers of influence on food market entities at the macro, meso and micro levels. At the first two through central and regional representations of executive bodies, and at the micro level on the basis of involvement of professional associations (for example, Honey cluster, Apple cluster of Bukovina, etc.) and cluster associations (for example, Ukrkondprom Association, Association of Livestock Breeders of Ukraine, Association bakers of Ukraine, the Association of Milk Producers, etc.). It is advisable to apply administrative levers of influence in two vectors: the creation of an organizational structure to promote the implementation of the HACCP system and the distribution of functions and powers within this structure. It is advisable to apply administrative levers in the direction of performing organizational, regulatory and regulatory functions to the State Food and consumer service, because it is currently the beneficiary in relations with the EU to create conditions for implementing the provisions of the EU directives in the domestic legal field and the activities of state authorities in cooperation with business entities.

In general, the proposed measures, in the form of the above model, should contribute to:

- the highest level of interest of business entities in the implementation of HACCP;
- increasing awareness and facilitating the implementation of HACCP for the average business entity in the food market;
- activating social movements for consumer protection;
- awareness of food consumers;
- strengthening the social responsibility of food producers and sellers, in particular in terms of security of their supply of goods;
- increasing the number of food producers that are able to produce products suitable for export to the EU.

#### **4. Conclusions**

1. The EU requirement for Ukraine to implement the HACCP system by business entities in the food market is one of the vectors of Ukraine's integration into the European legal space. At the same time, this requirement eliminates barriers to the export of Ukrainian food products in the EU markets.

2. Although the HACCP system was developed in the United States, it fully reflects the provisions of EU directives on food safety and organic food, so its implementation by domestic businesses in the food market opens for Ukraine not only the EU market but also the US market and other countries. HACCP has been adopted as the national

standard for food quality and safety.

3. Since 2015, Ukraine has fulfilled all the formal requirements for adapting domestic legislation on the implementation of the HACCP system and thus, received zero import duties from the EU on a number of goods exported from Ukraine, as well as an increase in quotas for the import of those food products for which there is an increased demand in the EU countries. This greatly contributed to the reorientation of exporters from the CIS countries to the EU, as well as an increase in the share of processed and finished products in total exports of food and food raw materials.

4. Despite the fact that according to the State Food and Consumer Service in Ukraine, 200 thousand business entities are required to implement the HACCP system, even 1 thousand business entities have not implemented this system yet. The leaders in this direction are exporters of food products and food raw materials.

5. The problems of ignoring the implementation of HACCP by domestic business entities are not homogeneous. This requires the use of fiscal, legal, administrative, and social and informational levers of influence.

6. The application of the proposed model of organizational measures will contribute to solving the identified problems, especially if these measures are reinforced by strict penalties and decisions on revoking licenses for the right to conduct business by entities that offer dangerous, environmentally polluted food products to the market.

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