ASSESSMENT OF EXPORT CAPACITY OF AGRICULTURAL SECTOR IN THE CONTEXT OF INTERNATIONAL COMPETITIVENESS

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Abstract

The article addresses the agricultural economic sector in the countries of Europe and Ukraine through the lens of specific characterizing parameters. The primary objective of this scientific article is calculation of actual comparative advantages of separate countries of the world in foreign trade in agri-food products using index RCAij and determination of the pattern of international competitiveness of products that appeared to be the backbone of agri-food items of export of Ukraine on the basis of calculation of the indices of relative trade advantages RTAij, proceeding from which to propose masures in the context of raising the level of competitiveness of national food products in the world food markets. The main methods of scientific research are method for calculating index of the revealed comparative advantage RCAi as the tool for a comprehensive assessment of agri-food sector competitiveness; method for calculating index of actual comparative advantages RCAi for the assessment of agri-food production international competitiveness; study of the pattern of international competitiveness of separate food products using indices of relative trade advantages RTAij. Following the complexity principle, the author offers the tools to intensify agricultural export capacity in the system of international competitiveness, which are consolidated in the following directions: institutional-regulating, organizational-economic, manufacturing-technological, and informational-communicating. The approach allows eliminating the causes restraining domestic agricultural export by securing a positive impact on strengthening the competitive status of Ukraine on the global market.

Keywords: agriculture, agricultural sector, agricultural products, export capacity, export capacity of the agricultural sector, international competitiveness, competitive advantages of foreign trade.
JEL Codes: E23; L23; L66; O13; Q17-19.

Introduction

Foreign economic trade development is a very essential factor securing the national economic competitiveness in current conditions of growing economic globalization. The existing challenges related to the increasing resilience of the global food system considerably accelerate the pace of global food trade expansion compared to the growth of agricultural and food output. Meanwhile, both national and international economic rules are applied to secure competitiveness in foreign trade.

The connections formed in trade between the countries are acquiring a global scale. Yet the growing competitiveness on global food markets and complicated trade, economic, and political links determine the need to intensify national export capacity. We consider that existing agricultural resource capacity creates favorable preconditions to increase export capacity in the process of establishment of a food niche and reinforcement of its competitive positions on the global market.

Meanwhile, the maintenance of national foreign economic security is a strategically essential priority of agricultural export capacity expansion. At the same time, improvement of export structure deserves specific attention since it secures entry to new markets with competitive agricultural products meeting the requirements of international standards. The defined preconditions stipulate the need to assess agricultural export capacity in the international competitiveness system and create efficient tools to realize the capacity.

The major tasks of the scientific article include the assessment of the agricultural export capacity in the context of growing international competitiveness due to actual competitive advantages of foreign trade in agricultural products of some countries worldwide based on the index analysis and the dynamics of international competitiveness of goods constituting the foundation of agriculture in Ukraine, according to the calculation of the Relative Trade Advantage Indices (RTA_{ij}). The conducted analytical research has created the basis to use efficient tools of agricultural export capacity implementation to improve its competitiveness on the global food markets.

The export capacity research problems have been and remain to be relevant on different stages of economic development of many countries. Some issues of export capacity assessment methodology and its interrelations with national competitiveness deserve special attention.

Export capacity is seen as the ground to determine national competitive advantages and strategic economic zones, including the national economic base in the first place. Therefore, export capacity is a certain assessment parameter (criterion) defining the country's spot in economic specialization (Gejets, 2007).

Stechenko D. deems that export capacity is the volume of benefits the national economy can produce and realize beyond its boundaries, as well as its capacity to reproduce competitive advantages on the international stage (Stechenko, 2002).

About the agricultural sector, major issues of its export capacity have been addressed by many researchers, who have seen international trade in agricultural products as an important driving force of economic growth for developing countries, and agriculture – the main products exporter (Verter, 2015).

Pepa T.V. (2001) mentions that agricultural and food industries form the agricultural export capacity of the country. Meanwhile, the food industry plays the most important role since its sectors have prospective opportunities and high export orientation level. The suggested approach to export capacity assessment is based on an examination of foreign economic links of the food industry and an analysis of the material, labor, financial resources, and raw materials that secure its development.

Zborovska Y.L. has a somewhat different opinion and offers to assess the export capacity of the agricultural products processing industry across a set of parameters that show the level of openness of the economy, possible entry to global economic space, level of the use of production capacity, export dynamics, export activity intensity, export orientation, and "terms of trade" (Zborovska, 2011).

Lavriv I. (2016) suggests the classification and compiles the unified system of factors that impact the agricultural export capacity. In particular, according to the author, it is essential to single out integration as an individual group of factors to develop and expand export opportunities.

Scientific research allows identifying various theoretical-methodological approaches to the factors (indicators) that generate national competitive advantages in the production of some type of agricultural output and foster the development of international trade. The most common methods of competitive advantages assessment include the comparison of real prices of food and agricultural products that are the indicators of comparative production efficiency of producers in the countries worldwide, etc.

When analyzing the essential features of agricultural export capacity, we have concluded that export capacity as the core

element of national economic growth depends not on the volume of exported goods but rather on a substantial number of factors impacting its forming. However, the formed export capacity largely generates competitive abilities of both the agricultural sector and the national economy as a whole.

Particular attention should be paid to the features of international competitiveness, which significantly impact the implementation of the agricultural export capacity of some countries worldwide. In this context, we consider the approach of researcher V.I. Hubenko quite important. He argues that the competitive advantage of the country on the international market is determined by some set of components identified by the researcher as "national rhombus" (Hubenko, 2003). The "national rhombus" components include factor terms, i.e. the factors (qualified workforce or infrastructure) that secure successful competition in the sector, demand terms offered by the sector for products or services on the domestic market, related and supporting sectors present or absent in the country and competitive on the international market, corporate strategy, its structure and competitors, i.e. the conditions in the country that define the nature of competition on domestic market and process of company establishment and management, as well as public policy that comprises the domestic market regulation.

We consider that the implementation of agricultural export capacity in the system of international competitiveness is possible in case of existing competitive advantages displayed on the global market through their comparison with relevant parameters-factors of other countries-competitors.

The research of various opinions and interpretations of scientists-economists regarding the main factors that map competitive advantages of a certain country in the production of a certain type of agricultural products shows that assessment of agricultural export capacity is the most relevant approach to the solution of the abovementioned problem. Therefore, the larger the national export

volumes of some products, the more competitive advantages the country has.

Proposed methodology

We suggest using the index analysis methodology to assess the efficiency of the agricultural export capacity since it contributes to the comprehensive and systemic selection of a set of parameters that generate the competitive advantages of a country in the production of a certain type of agricultural product. On this basis, the tools to increase export capacity in the system of international competitiveness can be offered to strengthen Ukraine's competitive position on the global agricultural market.

Moreover, the following generalizing parameters were used to assess the agricultural export capacity in the context of growing international competitiveness: Revealed Comparative Advantage Index (RCA), Relative Trade Advantage Index (RTA), Relative Export Advantage Index (RXA), Relative Import Penetration Index (RMP), etc.

Ukrainian researchers V. Hubenko (2003), N. Karasyova (2019), S. Kvasha (2013), V. Mesel-Veselyak (2016), V. Nelep (2014), T. Ostashko (2016), O. Senyshyn (2019), O. Shubravska (2002), O. Shpychak (2013), etc. have contributed essentially to the development of the agricultural production export capacity. The issues of international competitiveness of agricultural products are addressed by domestic and foreign researchers O.H. Bilous (2008), V.I. Hubenko (2003), B.M. Danylyshyn (2008), L.V. Deyneko (2007), Y.M. Kyrylyuk (2009), A.O. Kovalenko (2007), O.O. Kundytskyj (2020), S.V. Maystro (2005), B. Pashaver (2001), P.T. Sabluk (2008), S.I. Urba (2019), R. Kohls (1990), L. Scott (1992), J. Timothy (1997), J. Uhl (1990), T. Vollrath (1992), etc.

Their works are based on the research of the agricultural sector development and its export capacity, as well as the problems and perspectives of increasing agricultural export on international markets considering the depth of import segment of the respective product

markets and customs tariffs. However, we are interested in the concept of the agricultural export capacity of Ukraine and European states in the system of growing international competitiveness and its assessment based on the index analysis. D. Granabetter (2016), A. McCall & J. Timothy (1997) were among the first to use this specific comprehensive competitiveness research methodology. The authors offered the Revealed Comparative Advantage Index (RCA), which is accepted in the international economy to calculate the export capacity of a branch or a sector.

Result analysis and discussion

To examine export opportunities through concrete data, it is important to use the index analysis that includes a system of competitiveness parameters based on comparisons between sectors, which allows determining their competitive positions on the global market. Therefore, the parameters most often suggested by foreign scientists should be used (Granabetter, 2016; McCall & J. Timothy, 1997). Revealed Comparative Advantage Index (RCA), Relative Trade Advantage Index (RTA), Relative Export Advantage Index (RXA), and Relative Import Penetration Index (RMP) are the main of them.

Meanwhile, D. Granabetter (2016) focuses attention on the methodology for Revealed Comparative Advantage Index (RCA) calculation used in the international economy to determine a sector's export capacity. The analysis of this parameter helps determine the competitiveness conditions for a sector compared to the other sectors of the national economy, and the indicator includes the export and import volumes.

It seems appropriate to use the methodology of determining the competitive advantages to research the agricultural production of a country in the context of international competitiveness with the view to make comparisons with other countries worldwide. It stipulates the calculation of the *Revealed Comparative Advantage Index (RCA$_{ij}$)* by the formula (McCall and Timothy, 1997):

$$RCA_{ij} = \frac{2 \times (X_{ij} - M_{ij}) \times (X_{kw} + M_{kw})}{(X_{kj} + M_{kj}) \times (X_{iw} + M_{iw})}, \quad (1)$$

where RCA_{ij} – the Revealed Comparative Advantage Index of the i commodity group of the j country; X_{ij} – the cost of export of the i commodity group of the j country; M_{ij} – the cost of import of the i commodity group of the j country; X_{kw} – global export of all commodity groups; M_{kw} – global import of all commodity groups; X_{kj} – export of all commodity groups of the j country; M_{kj} – import of all commodity groups of the j country; X_{iw} – global export of the i commodity group; M_{iw} – global export of the i commodity group.

The RCA$_{ij}$ index is calculated considering the volumes of global trade in all goods and global trade in products of a separate commodity group (agricultural products in this case) that is the object of the research. Therefore, the index provides a more objective view over the international competitiveness of various countries in trade in certain products. It is worth mentioning that the positive RCA$_{ij}$ rate indicates the availability of competitive advantages for the country, and the negative rate shows their absence. Moreover, the higher the rate, the stronger the competitive advantages of a country.

We prefer to use the *Revealed Comparative Advantage Index RCA$_i$* to assess agricultural export capacity in the system of international competitiveness. The parameter will help determine the competition conditions in agriculture compared to other national economic sectors based on statistics on the export and import of certain commodity groups.

RCA$_i$ index (Revealed Comparative Advantage) unifies the export and import of the i sector with the total export and import of all sectors of a country (McCall and Timothy, 1997):

$$RCA_i = \left[\frac{X_i - M_i}{X_i + M_i} - \frac{\sum (X_i - M_i)}{\sum (X_i + M_i)} \right], \quad (2)$$

where *RCA$_i$* – the Revealed Comparative Advantage Index of the i sector; X_i – the cost of export of the i sector products; M_i – the cost of import of the i sector products.

The positive index rate means that the i sector has a competitive advantage. If the i sector is a net exporter, it exports more

compared to all economic sectors totally. The negative index rate shows comparative losses.

It is essential to assess the dynamics of international competitiveness of some food products that are the foundation for the country's agricultural export in the period under research in the context of examining the export capacity. In this regard, it is reasonable to calculate the *Relative Trade Advantage Index (RTA$_{ij}$)*, which stipulates the use of export and import parameters for a certain product by the formula (McCall and Timothy, 1997):

$$RTA_{ij} = RXA_{ij} - RMP_{ij}; \qquad (3)$$

де *RXA$_{ij}$* – the Relative Export Advantage Index of the *i* product in the *j* country; *RMP$_{ij}$* – Relative Import Penetration Index of the *i* product in the *j* country.

The positive rate of the parameter indicates the relative advantages in foreign trade, and the negative rate – relative disadvantages.

The Relative Export Advantage Index *(RXA$_{ij}$)* is calculated by the formula (McCall, and Timothy, 1997):

$$RXA_{ij} = (X_{ij} / \sum_{l,l \neq j} X_{il}) / (\sum_{k,k \neq i} X_{kj} / \sum_{k,k \neq i} \sum_{l,l \neq j} X_{kl})$$

$$(4)$$

where *X* – export cost; *i* and *k* –products; *j* and *l* – countries.

In other words, the *RXA$_{ij}$* index is the ratio of the country's share in the global export of some product and the country's share in the global export of all other products. The feature of the parameter is that global export is always calculated as the total export of all countries excluding the one under research. In a similar manner, the export rate of the product under research is excluded from global export volumes. It avoids double counting when the country's export (product) is the numerator and the component of the denominator. The aspect is especially relevant if the product under research constitutes a significant share of global export.

The RXA$_{ij}$ index rate has the following interpretation: if the rate exceeds 1 – the country has competitive advantages regarding the export of the product under research; RXA < 1 indicates competitive disadvantages.

Relative Import Penetration Index (RMP$_{ij}$) is similar to *RXA$_{ij}$*, the only difference is that import is taken into account (McCall and Timothy, 1997):

$$RMP_{ij} = (M_{ij} / \sum_{l,l \neq j} M_{il}) / (\sum_{k,k \neq i} M_{kj} / \sum_{k,k \neq i} \sum_{l,l \neq j} M_{kl})$$

$$(5)$$

If the *RMP$_{ij}$* rate exceeds 1, import dependence is strong, i.e. there is a competitive disadvantage. If it is below 1 – the dependence is low, i.e. there is a competitive advantage.

The methodology of theoretical analysis, systemic and analytical methods, and generalization and grouping methods have contributed to outlining the measures to improve the agriculture export capacity in the context of growing international competitiveness.

Fig. 1 shows the dynamics of Ukraine's competitive advantages in foreign trade in some commodity groups for 2015–2020.

As we can see, the obtained results (Table 1) show that in 2020, Argentina (RCA$_{ij}$=5.056), New Zealand (RCA$_{ij}$=4.378), and Brazil (RCA$_{ij}$=3.310) had the strongest comparative advantages. It is explained by a large share of agricultural export in the total export of these countries and comparatively low volumes of agricultural import.

Therefore, the analysis of the data in Table 1 resulted in the following conclusions:

In the first place, there are groups of countries demonstrating significant levels of comparative advantages or their absence.
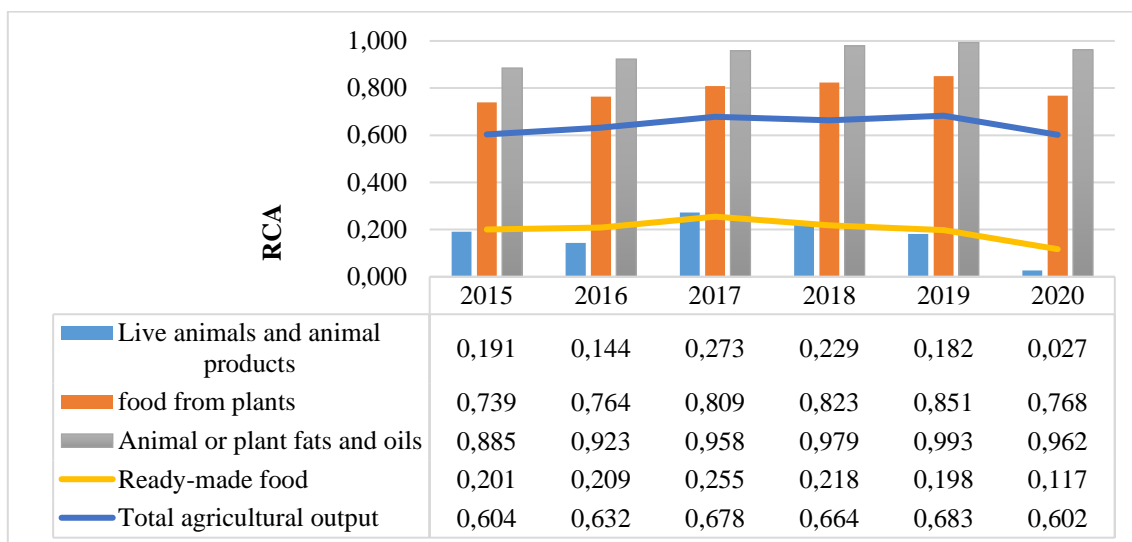
	2015	2016	2017	2018	2019	2020
Live animals and animal products	0,191	0,144	0,273	0,229	0,182	0,027
food from plants	0,739	0,764	0,809	0,823	0,851	0,768
Animal or plant fats and oils	0,885	0,923	0,958	0,979	0,993	0,962
Ready-made food	0,201	0,209	0,255	0,218	0,198	0,117
Total agricultural output	0,604	0,632	0,678	0,664	0,683	0,602

Figure 1. Dynamics of Ukraine's competitive advantages in foreign trade in some agricultural commodity groups for 2015–2020

Source: compiled by the authors.

Table 1. Calculation of actual comparative advantages of countries worldwide in foreign trade in agricultural products in 2020

	Country	Agricultural export, million $	Agricultural import, million $	Export, million $	Import, million $	RCA$_{ij}$
1.	**EU countries (27)**	556668	487086	5461006	5140007	0.109
2.	Australia	30559	11895	250578	211109	0.671
3.	Argentina	33296	3692	54884	42354	5.056
4.	Brazil	85150	10181	209878	166276	3.310
5.	Egypt	5170	13208	26630	59843	-1.544
6.	Israel	1969	6420	49763	69985	-0.617
7.	India	32084	21403	276302	372854	0.273
8.	Indonesia	36624	18567	163306	141622	0.983
9.	Iran	2924	8331	53543	38757	-0.973
10.	Kazakhstan	3276	3904	46447	37222	-0.125
11.	Canada	50795	35889	390599	414165	0.308
12.	China	67292	193467	3487541	2926625	-0.327
13.	Columbia	7665	6220	31008	43489	0.322
14.	Korea	7184	27685	512498	467633	-0.347
15.	Malaysia	23350	17610	234127	189855	0.225
16.	Mexico	34569	21387	417670	393248	0.270
17.	New Zealand	24896	4842	38919	37152	4.378
18.	Norway	1075	7723	84459	80447	-0.670
19.	UAE	13129	16366	319278	225741	-0.099
20.	Saudi Arabia	3517	20473	17385	137998	-1.812
21.	USA	147923	146495	1431610	2407527	0.006
22.	Turkey	19595	16546	169651	219515	0.130

23.	**Ukraine**	**22018**	**5513**	**49220**	**53929**	**2.657**
24.	Chili	12027	7159	73485	59226	0.609
25.	Switzerland	9760	12802	319318	291981	-0.083
26.	Japan	5943	56899	641319	635460	-0.663
	Total world					

*Source: compiled by the authors on the basis of (FAOSTAT (2020).

The countries without comparative advantages in foreign trade in agricultural products include Iran and Saudi Arabia, which are the oil-producing countries in the Middle East. In 2020, their Revealed Comparative Advantage Indices (RCA_{ij}) were -0.973 and -1.812, respectively. Natural conditions and climate prevent these countries from securing enough amounts of domestically produced food but significant income from oil export enables their import. The abovementioned countries also include Egypt, Israel, Japan, China, and Korea.

Secondly, Ukraine should be mentioned among the countries demonstrating comparative advantages of domestic agricultural production on the global market. The situation here is somewhat different. The Revealed Comparative Advantage Index for the country is з 2.657 due to small volumes of agricultural import ($ 5,513 million in 2020). Meanwhile, the research on the competitiveness of the domestic agricultural output confirms its international competitiveness, which is higher than the agro-industry production in Ukraine as a whole.

Thirdly, some developed countries show insignificant comparative advantages in domestic agricultural output, namely the USA (RCA_{ij}=0.006), Canada (RCA_{ij}=0.308), Turkey (RCA_{ij}=0.130), and the EU countries (RCA_{ij}=0.109). It is explained by the fact that agriculture is not the major export specialization sector in these countries, so it accounts for a small share of their export. However, they play an essential role in the global export of agro-industrial products by the agricultural export volumes.

Calculation of the Relative Trade Advantage Index (RTA_{ij}) helps analyze the international competitiveness of agricultural products (Fig. 2) that were the basis of agricultural export in Ukraine in 2018–2020.

Calculated parameters are the ground for the following conclusions:

− the positive factor is the fact that all goods selected for the research, excluding meat and edible products of fresh poultry, were competitive on the foreign market in 2018-2020, which is confirmed by the positive RTA rates*;*

− Fig. 2. shows a substantial fall in the competitiveness of almost all food products, excluding barley, in 2020 compared to 2019 due to falling export as the result of hostilities between Ukraine and the Russian Federation that have affected trade between the countries. For instance, the RTA index for wheat declined by 0.008 in 2020 compared to 2019, for maize – by 0.019, etc. It indicates quite a strong Ukraine's dependence on the condition of foreign markets and requires the search for ways to diversify export;

− the calculated Relative Trade Advantage Indices (RTA_{ij}) for grains in 2018–2020 show their competitiveness. Although grains account for the largest share in the structure of Ukrainian agricultural export, the absolute *RTA* value is relatively small. For instance, the *RTA* index for wheat was 0.019 in 2020, for barley – 0.031, and maize – 0.043. It is explained by the fact that in addition to export, some types of grains were consistently imported during the period under research. Moreover, grains account for a significantly high share of global export. Furthermore, significant fluctuations in export volumes over the years cannot be considered as a positive factor since Ukraine doesn't have a consistent position on the global market, while the competitiveness of its products is mostly of a

price nature and largely depends on the foreign market condition.

Taking into account the abovementioned problems and the best practices of the countries worldwide, it is obvious that the strategic importance of agriculture in the context of growing international competitiveness requires the implementation of efficient tools to increase its export capacity considering the destabilizing impact of current challenges and threats of geopolitical nature (Fig. 3.).
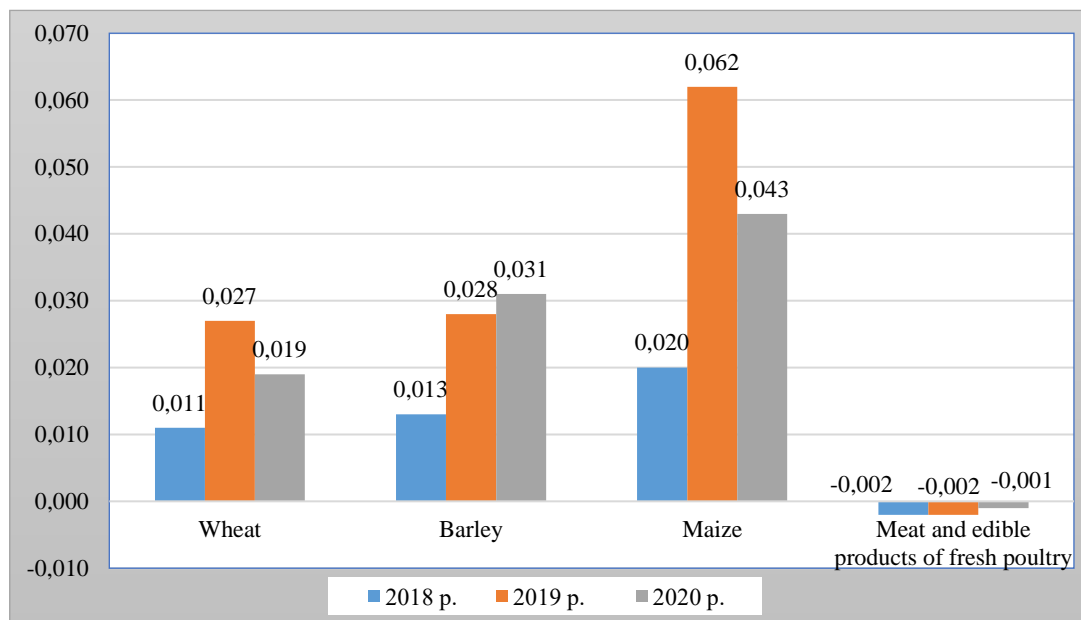

Figure 2. Dynamics of the Relative Trade Advantage Indices (RTA_{ij}) of the main agricultural product types in Ukraine in 2018–2020

Source: compiled by the authors on the basis of (FAOSTAT, 2020).

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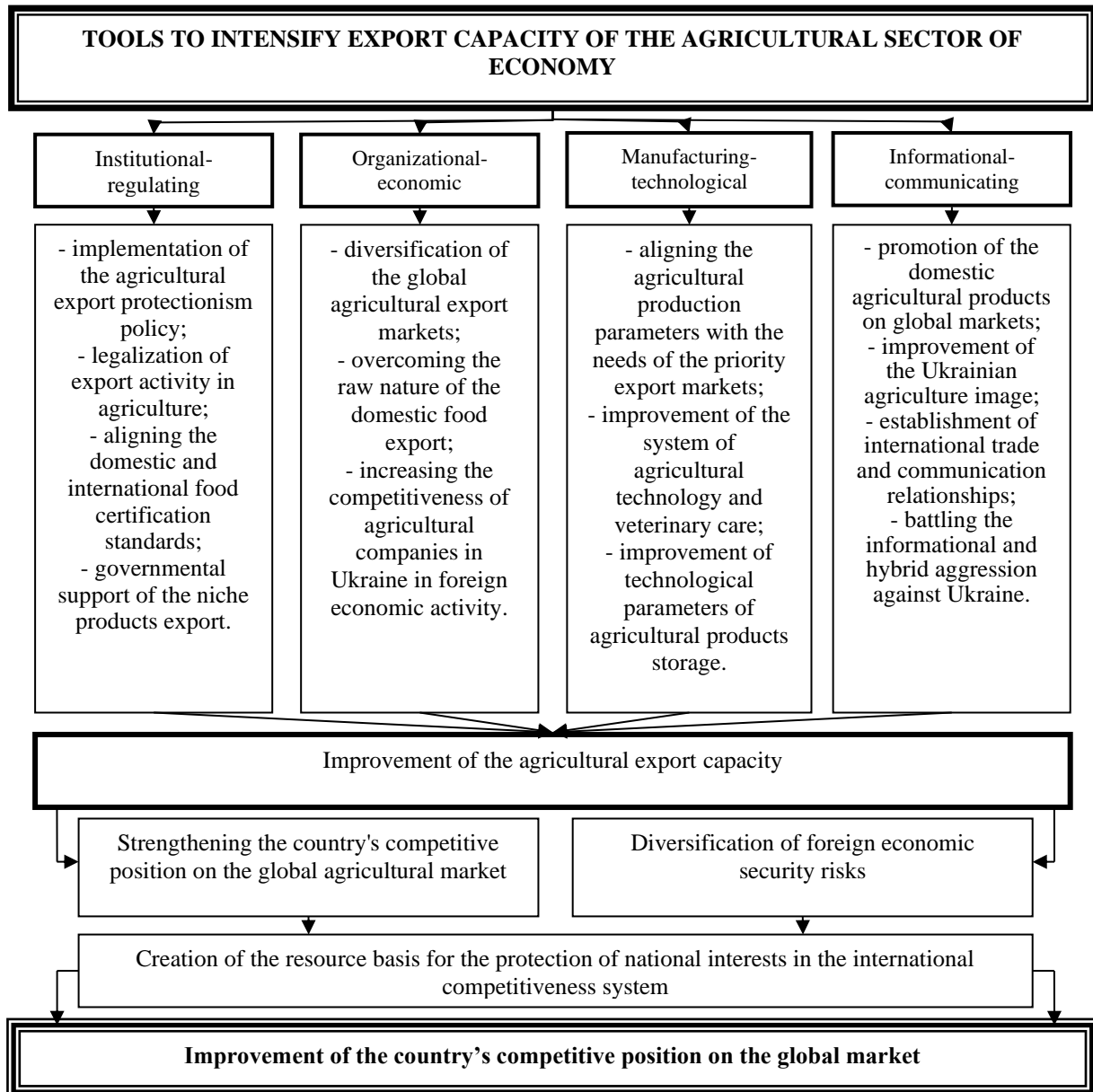
TOOLS TO INTENSIFY EXPORT CAPACITY OF THE AGRICULTURAL SECTOR OF ECONOMY

Institutional-regulating	Organizational-economic	Manufacturing-technological	Informational-communicating
- implementation of the agricultural export protectionism policy; - legalization of export activity in agriculture; - aligning the domestic and international food certification standards; - governmental support of the niche products export.	- diversification of the global agricultural export markets; - overcoming the raw nature of the domestic food export; - increasing the competitiveness of agricultural companies in Ukraine in foreign economic activity.	- aligning the agricultural production parameters with the needs of the priority export markets; - improvement of the system of agricultural technology and veterinary care; - improvement of technological parameters of agricultural products storage.	- promotion of the domestic agricultural products on global markets; - improvement of the Ukrainian agriculture image; - establishment of international trade and communication relationships; - battling the informational and hybrid aggression against Ukraine.

Improvement of the agricultural export capacity

Strengthening the country's competitive position on the global agricultural market	Diversification of foreign economic security risks

Creation of the resource basis for the protection of national interests in the international competitiveness system

Improvement of the country's competitive position on the global market

Figure 3. Priority tools to improve the agricultural export capacity in the international competitiveness system

Source: compiled by the authors.

In the conditions of total informatization of economic relations, the expediency of implementing information and communication tools for increasing the export potential of the agricultural sector appears. This involves the systematic promotion of domestic food on priority world agricultural markets, through the implementation of an information campaign using the network of diplomatic missions of the state, opportunities to reach the target audience of foreign mass media, and domestic trade capacities outside of Ukraine. It is expedient to implement advertising support mechanisms for popular agrarian brands, to form a positive market image of representatives of the domestic agrarian sector of the economy, as reliable partners in the organization of the supply of quality food to the consumer and the fulfillment of contractual obligations in conditions of uncertainty about the parameters of the development of the market environment.

It is important to implement the tools of systematic countermeasures against the information-hybrid aggression, to which the image of the agricultural sector of the economy is periodically exposed in the international trade arena, primarily in the aspect of carrying out planned provocations regarding the quality and safety of exported food. In this regard, it is advisable to carry out an information campaign to guarantee the reliability and safety of the organization of agrarian and production business processes, to introduce the practice of systematic expert evaluation of the quality and safety of agrarian production, to ensure uninterrupted access of representatives of export markets to production and economic processes.

Conclusion

Mobilization and growing agricultural export capacities require the strategic orientation towards the achievement of priority benchmarks of agricultural development, the main of which we recommend the following: (Urba, 2019):

1. Implementation of the systemic policy of the domestic agricultural export protectionism and support based on optimization of the ratio of tariff and non-tariff regulation means.

2. Simplification of the export activity licensing procedure, application of the export duty preferential treatment practice for the products of underdeveloped branches of agriculture.

3. Searching for the opportunities to increase the food export duty-free quotas (especially on the markets of the EU countries in the framework of the ratified EU-Ukraine Association Agreement), lobbying the export and trade preferences for the domestic agriculture under the concluded bilateral agreements between Ukraine and strategic partner countries.

4. Mandatory introduction of the Hazard Analysis and Critical Control Point (HACCP)

to secure the control over the business processes of agricultural economic entities on every stage of production.

5. Ensuring strategic orientation towards the intensification of European integration processes in agricultural export and elimination of institutional gaps in the implementation of the economic part of the EU-Ukraine Association Agreement.

6. Search for unused reserves to develop export activity with Asian and African countries with high demand, agricultural market capacity reserves, and aggravating domestically produced food deficit.

7.Improvement of technological parameters of agricultural products storage during a marketing year to secure an opportunity for their export at maximum market prices by the increase of innovative warehousing capacities, the maintenance of appropriate storage conditions, and the creation of opportunities to introduce the practice of establishment and maintenance of minimum agricultural insurance reserves to guarantee the continuous export contracts execution.

8. Deepening the diversification of global agricultural markets for the export of domestic food on the basis of continuing to reduce dependence on the markets of the CIS countries, in particular due to the military aggression of the Russian Federation against Ukraine, which caused significant damage to the agricultural sector of the economy, especially in regions where active hostilities are taking place.

The comprehensive implementation of the suggested tools to realize the agricultural export capacity will improve the functionality of preventive mechanisms for the protection of the national interests on a geopolitical scale in the system of international distribution of priority impact areas and secure the creation of resource reserves to improve the domestic economic competitiveness on the global markets.

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