

Fulfilling the Export Potential of Agricultural Production in the Context of Aggravating Global Food Crisis

Hassan Ali Al- Ababneh¹, Ainur Osmonova², Ilona Dumanska³, Petro Matkovskiy⁴ and Andriy Kalynovskyy⁵

¹Faculty of Administrative and Financial Sciences - E - Marketing and Social Communication, Irbid National University, Irbid, Jordan

²Department of Accounting, Analysis and Audit, Faculty of Economics, State Educational Institution of Higher Professional Education Kyrgyz-Russian Slavic University named after the first President of the Russian Federation B.N. Yeltsin, Bishkek, Kyrgyz Republic

³Department of International Economic Relations, Faculty of International Relations, Khmelnytskyi National University, Khmelnytskyi, Ukraine

⁴Department of Accounting and Taxation, Faculty of economics, Vasyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine

⁵Department of Foreign Trade and Customs, Institute of Economics and Management, Lviv Polytechnic National University, Lviv, Ukraine ilonadumanska@gmail.com

Corresponding author: Hassan Ali Al-Ababneh, e-mail: hassanialalababneh@gmail.com

Summary

Creation and implementation of export-oriented strategy is an urgent issue of economic development of any country. In an export-oriented model of economic development, exports should be a means of promoting economic growth and a tool to strengthen existing and potential competitive advantages. Agricultural production is the key factor in exports and the source of foreign exchange earnings in many countries. However, the export potential of agricultural producers may be inefficiently fulfilled due to the heterogeneity of countries in terms of economic development, trade relations and border policy. The aim of the research is to study the nature, main trends and problematic aspects of fulfilling the export potential of agricultural production in the context of aggravating food crisis. The study involved general scientific methods (induction and deduction, description, analysis, synthesis, generalization) and special (statistical method, economic analysis, descriptive statistics and interstate comparisons, graphical method). The need to ensure food security by countries around the world urges the importance of the agricultural sector as a catalyst for economic development, sources of foreign exchange earnings, investment direction, etc. The study of agricultural specialization led to the conclusion that wheat and sugar are goods with the highest export potential. It is substantiated that the countries of South America, OECD, North America and Europe have the highest level of realization of export potential of agricultural production, and African countries are import-dependent. In addition, the low export orientation of Africa and Asia due to the peculiarities of their natural and climatic conditions is established based on the assessment of export-import operations in the regional context. The internal and external export potential of each of the regions is analysed. Economic and mathematical simulation of assessing the impact of the most important factors on the wheat exports volumes was applied, which allowed predicting wheat exports volume and making sound management decisions regarding the realization of the export potential of agricultural companies. The inverse correlation

between the exports volume and wheat consumption per capita, and the direct correlation between the effective size and area of land used for wheat cultivation was established through the correlation and regression analysis.

Keywords: *export potential, agricultural production, exports, integration, food security.*

1. Introduction

One of the most difficult challenges today is to prevent the food crisis. According to UN experts, it is the worst in the last 50 years of human development and requires an immediate response from governments to avoid a catastrophe.

It should be noted that food security problems directly depend on the development of the agro-industrial sector, which is currently the basis for increasing its export potential, a factor in ensuring national food security and meeting public demand for major groups of agricultural products.

The food crisis is most often associated with the rapid growth of the world's population and the irrational use of natural resources, the decline in the level of ecologisation of economic development. Most countries focus on investing in profitable and fast-paying sectors of the economy, while the agricultural sector was financed mostly on a residual basis. In addition, there has been a tendency to reduce the area under crops suitable for growing food crops in recent years, while the cultivation of industrial crops used for biofuel production has become increasingly popular. All this contributed to the growth of the deficit of agricultural

products and, as a consequence, to the increase of the price level for them. Thus, according to [1], prices have almost doubled in the last decade, making these groups of goods less accessible to low-income people.

In the context of the Covid-19 pandemic, the situation in this area worsened significantly, therefore it is fair to assume that over the next few years there will be a decline in food security in the world, accompanied by disruptions in food supply chains even in economically developed countries. In addition, the spread of the pandemic and the introduction of significant quarantine restrictions have led to a significant shortage of labour involved in agriculture in different countries, which could not but affect the yield, quantity and quality of harvested crops. The pandemic also significantly affected the development of animal husbandry, restricting free access to feed and veterinary drugs.

It is worth noting that since the beginning of the pandemic most countries have resorted to significant export restrictions in order to provide food for their domestic markets, which also significantly affected the international market and provoked supply disruptions and rising prices for agricultural products.

However, rethinking the strategic importance of each of the economic sectors of development and understanding the realities of today, an increasing number of countries urge the need to develop and promote the agro-industrial complex. In the context of such changes, appropriate agricultural programs, systems of financial incentives and support for farmers are being developed, which significantly affects the level of supply of agricultural products within individual countries. It is under such conditions that issues related to the development and effective use of the export potential of agricultural production become especially relevant.

Today, it is one of the independent elements of the country's export potential, which is able to increase the competitiveness of countries that have such potential and are able to use it effectively. In addition, there is a shift in economic emphasis in favour of stimulating the development of countries that have significant prerequisites for agricultural development, as well as developed logistics and marketing systems that allow creating reliable and uninterrupted food supply chains.

Thus, a rational approach to the use of the export potential of agricultural production will create the preconditions not only to overcome the negative effects of the food crisis, but also to equalize food security at the international level, and will balance foreign economic activity in this area. The aim of the research is to study the features of the export potential of agricultural production in different countries.

Research objectives:

determine the essence and features of the export potential of agricultural production at the international and national levels;

analyse the dynamics of consumption of the main groups of agricultural products in the world;

outline indicators that describe the export potential of agricultural production and allow assessing it;

study and identify current trends in fulfilling the export potential of agricultural production in the regional context;

identify problematic aspects of fulfilling the export potential of agricultural products;

outline the factors influencing the export potential and assess the level of their impact on the volume of exports of agricultural production;

provide analytical conclusions on fulfilling the export potential of agricultural production in the context of the global industrial crisis.

2. Literature review

The efficiency of export potential largely determines the financial stability of the state. In turn, this problem is especially important for agricultural producers, as modern globalization processes of the world economy have intensified competition in both foreign and domestic markets. European exports are the main form of fulfilling the export potential. Actually, the export potential of an agricultural producer characterizes the part of the production potential that can be directed to the creation of products to be sold in foreign markets.

Lavriv [2] proposed a classification and arranged a single system of factors influencing the export potential of agricultural companies. In particular, singling out integration as a separate group of factors is important for the fulfilment of their export potential.

Huai [3] identified the country's reputation as an important factor influencing export quality. The results of their research showed that the country's reputation has a positive and significant impact on the quality of exports. Based on research, it is substantiated that the rapid increase in population in general slows down agricultural production and exports of the country [4]. In developing countries, population growth rates are almost twice as high as in developed countries, which creates difficulties for agricultural production in these countries due to damage to the physical environment caused by population growth, and limits agricultural production opportunities for farmers [1].

Food security and supply is one of the global problems of mankind. In their article, Turobova and Kodirov [5] covered the importance of farms in agriculture and their role in agricultural exports.

Foreign trade in agricultural and food products is a significant reflection of the economic situation observed in the current functioning of agriculture, food industry and certain types of trade in a particular country [6]. Thus, assessing the export potential of agricultural and food products in the Visegrad countries in 2005-2017, researchers proved that exports of agricultural and food products to the Visegrad countries are vulnerable to economic trends, there is a significant degree of competitiveness in exporting food products of animal origin to these countries, as well as the highest level of competitiveness of foreign trade in food products of plant origin in relation to cereals, while trade in fruits and vegetables is becoming less important.

In response to rising world prices for agricultural and food products, many countries have introduced controls on their agricultural exports, using taxes, quotas and total export bans. Besides, many countries have maintained export taxes not only on agricultural goods but also on forestry and fishery products, minerals, metals and precious stones over the past few decades [7].

Studying the export of agricultural and food products in Georgia, Maximov and Saha [8] found that it is concentrated in a few goods and a few unpretentious markets, which makes it extremely vulnerable to a small number of commodity and geographic markets. At the same time, the diversity of climatic conditions and large water resources create a significant potential for growth and diversification of Georgian agriculture. Today, two main restrictions limit the export of agricultural and food products of Georgia: 1) the shortage of raw materials due to low agricultural productivity limits the number of goods available for export; 2) most export chains are poorly organized. Therefore, the government should encourage and support the establishment of agricultural clusters in the short term, potentially in the context of a broader initiative of agricultural and industrial clusters.

Pakistan is an agriculture-based country, so the agricultural sector is the backbone of the national economy. Given the national economy and the agricultural sector, it is necessary to focus on the export of agricultural products to improve the life of local farmers. A study conducted by Khan [9] revealed short-term and long-term factors affecting agricultural exports.

Osabohien [10] explored the potential of agricultural exports in Nigeria, which is fulfilling it by exporting both traditional goods such as cocoa, rubber, palm products, cotton, hides, crafts and textiles, and non-traditional ones.

The Federal Government of Nigeria prioritizes agricultural development through its Economic Recovery and Growth Plan, which seeks to create new jobs in labour-intensive sectors, including agriculture, and turns the country into a powerful exporter of major crops, including rice, cashews, peanuts, vegetable oil and cassava. The government seeks to promote sustainable growth in both crop production and agricultural exports through a number of policies, including the development of key crop processing areas and reform of the quality control process. There are also huge opportunities for the development of non-traditional exports of products such as medicinal plants, snails, mushrooms, cultivated wildlife and more. It is reasonable to use the practice of other developing countries that the growth of agricultural exports should be based on turning medium-sized and large commercial companies into efficient small farms.

Agriculture also plays a crucial role in Iran's economy in terms of food security, job creation and foreign income. Using data for 38 destination countries from 1982 to 2017, Shokrollah [11] found a direct and significant impact of GDP and population of trading partners on Iran's agricultural exports, while distance and border barriers imposed by destination countries show significant reverse effect. Measures to promote competitiveness are recommended, along with free bilateral and regional trade agreements to remove border barriers.

The article Pang and Wang [12] covers the situation with Chinese agricultural exports from 2007 to 2016 and the problems of Chinese agricultural exports, as well as analyses the international multilateral system of environmental and ecolabelling of Chinese agricultural exports and the impact of these environmental regulations on exports. The authors conclude that international environmental regulation has a significant negative impact on Chinese agricultural exports.

Ferro [13] introduced a standard cap index to study the impact of food safety standards on international agricultural exports. This standard limitation indicator is based on the use of maximum pesticide residue levels for 61 importing countries and 66 different products. The index takes into account both the amount of pesticides regulated for each product and the permissible level of these pesticides by each importer. The data obtained indicate that compliance with strict standards increases the fixed costs of exports to the destination.

An analysis of the Baltic countries by Remeikiene [14] showed that the realization of export potential also depends on the characteristics of agriculture and subsidies from EU funds, which are relatively low compared to the old EU member states. Besides, support for agriculture creates relatively unequal conditions of competition for other

economic activities. As a result, it is doubtful whether the export of agricultural products contributes to the prosperity of the Baltic economy. A correlation and regression analysis was used covering data from 2000–2016 to achieve this goal — studying the links between agricultural exports and economic growth in the Baltic States. Empirical calculations have shown that the export of agricultural products (in some sections) contributes very little to the growth of GDP in the Baltic economies; however, this negatively affects labour market indicators (self-employment, employment in the land sector, the level of the labour market).

Fulfilling the export potential of agricultural producers is also influenced by integration processes. This conclusion is confirmed by researchers Richardson [15], who estimated the potential effects of free trade areas and common currency based on data from 45 African countries for 1996 to 2018. Accession to the Arab Maghreb Union (AMU), the Community of Sahel-Saharan (CS-SS), the Common Market for East and South Africa (COMESA), the East African Community (EAC), the Economic Community of Central African States, the Intergovernmental Authority on Development (IGAD), the Economic Community of West African States (ECOWAS), the South African Development Community (SADC) or membership in the African Continental Free Trade Area (AFCFTA) have boosted agricultural exports.

Anania [16] emphasizes the obligation to restrict exports both within and outside the WTO. Gilbert [17] discusses why international commodity agreements are not an effective option to address food security issues on a multilateral basis, including the introduction of stricter rules on export restrictions. In principle, it is the activities of major grain countries, importers and exporters that have the greatest impact on international markets related to food security, which means that a voluntary binding agreement between a small group of largest producers, exporters and importers may be sufficient to obtain desired outcome [18].

Sidorskiy [19] studied the impact of the creation of the Common Economic Space in the Eurasian Economic Union on the creation of an effective competitive environment and ensuring the proper functioning of the common agricultural market.

Several researchers have studied the impact of economic integration on agricultural performance with different outcomes. Some studies revealed positive effects, while others found negative ones. However, some studies confirm a slight relationship between economic integration and agricultural performance. In particular, assessing the impact of the free trade area on the promotion of intra-regional trade, Elbushra [20] confirms that free trade areas promote the export of agricultural products. Olayiwola [21]

confirms that regional integration and trade blocs stimulate exports. Other studies by Shobande [22] indicate that economic integration is a strong driver of export efficiency, while an effective nominal exchange rate slows down agricultural exports. Other studies that report a negative correlation between exchange rates and agricultural exports in the case of Bangladesh and in the case of Vietnam [23, 24].

Thus, the issue of fulfilling the export potential of agricultural producers of different countries is widely represented in scientific publications, but the outlined topic requires current research on the development of agricultural exports.

3. Methods

Figure 1 shows the research design in a generalized form. Given that the problem of fulfilling the export potential of the agricultural sector is global, OECD countries, North America, Europe, Africa, South America and Asia are selected as the object of study. This approach will allow a comprehensive study of the outlined issues. The main indicators to be used for the analysis are: imports, exports and foreign trade balance by major groups of agricultural products characterized by the highest level of consumption in the international market.

The main methods used in this study are statistical analysis, index, graphical and analytical methods, methods for estimating structural dynamic shifts, comparisons and monographic method. The study also involved common methods of economic research, in particular: theoretical generalization and comparison, induction and deduction (when revealing the content of the export potential of agricultural production, drawing conclusions); synthesis and economic analysis (to assess the current state and development trends of agricultural exports); graphical, economic-statistical and interstate comparisons (for the analysis of agricultural exports); statistical groupings (to assess the domestic and external export potential of agricultural products in the regional context); economic and mathematical simulation (regression analysis) (to determine the impact of factors on wheat exports), etc.

For the purpose of statistical analysis, we used the macro function “Regression” of the MS Excel add-in Analysis Package, which allowed determining the influence of factors on the resultant value and to building the corresponding linear regression equation.

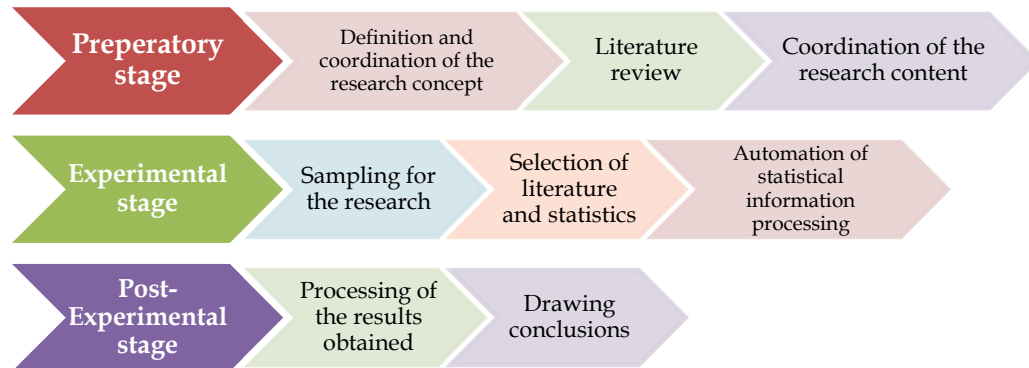


Figure 1. Abstract research design

4. Results

Export potential is determined at the international level by significant competitive advantages for exporters and their ability to effectively use existing market opportunities. In numerical terms, it will be represented by the share of export products in the international market.

At the national level, this category should be considered as a set of opportunities and resources to increase agricultural production in order to carry out export operations, and will be expressed by the value of the foreign trade balance in the study area.

Fulfillment of the national export potential can become a solid background for the development of other sectors of the economy due to its diversification capacity. At the international level, export potential is one of the powerful tools for equalizing food security between countries.

The main factors influencing the export potential of agricultural production are the following:

- geographical location of the country, its natural and climatic conditions;
- social traditions of agricultural development;
- availability of skilled labour for employment in agricultural production;
- financial opportunities for the development of agricultural production;
- effective regulatory framework in the field of export operations;

- opportunities for diversification of agricultural production into other sectors of the economy;
- credit support for the development of export potential of agricultural producers;
- availability of standards for agricultural production and quality assurance of such groups of goods;
- the ability of exporters to respond flexibly to changes in agricultural market conditions.

Examining the export potential of agricultural production, it is necessary to analyse the consumption of the main groups of agricultural products per capita (Figure 2), which will determine the priority of their exports.

According to Figure 2, it can be concluded that during 2014-2020 the priorities of consumption are stable, with wheat and sugar being in the greatest demand, and therefore these goods will have a higher export potential. This statement is supported by the data of Figure 3.

Figure 3 illustrates the dynamics of exports of major groups of goods that were top in export operations during 2014-2020. It should be noted that the largest exports of certain goods dropped to 2016 and 2020. The structure of exports during the study period remains virtually unchanged.

In order to study the export potential in detail, we will analyse the exports volume of the main groups of agricultural products in the regional context, namely in the OECD countries, North America, Europe, Africa, South America and Asia. In this case, the main indicators that will be used for analysis are: imports, exports and foreign trade balance by goods (Table 1).

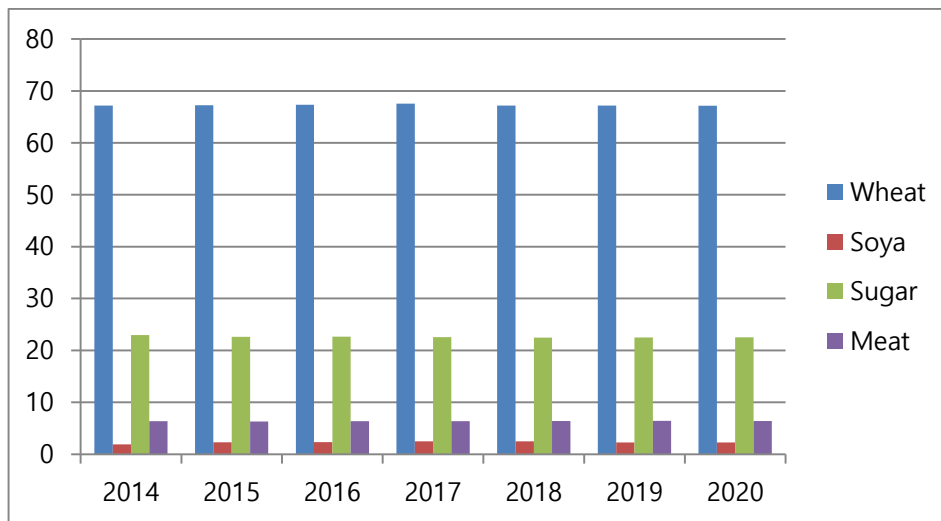


Figure 2. Volumes of consumption of agricultural products per capita in 2014-2020, kg

Source: calculated and built by the authors based on [25].

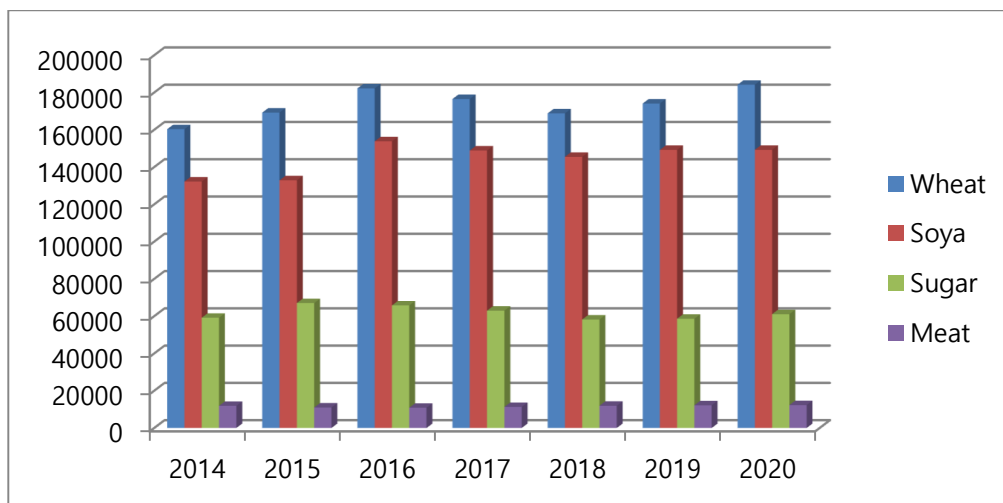


Figure 3. Export volumes of export-oriented groups of goods in 2014-2020, thousand tons

Source: calculated and built by the authors based on [25].

Table 1. Exports, imports of agricultural products in 2014-2020 in the regional context

Indicator	2014	2015	2016	2017	2018	2019	2020	
	wheat							
Import	38145.58	35846.23	36406.23	39272.56	38592.25	37998.35	38919.14	
Export	104765.97	100705.85	108048.69	89902.18	87783.3	94436.12	99712.98	
Balance	66620.39	64859.62	71642.46	50629.62	49191.05	56437.77	60793.84	
soya								
Import	26797.1	28784.6	28159.07	28176.65	31138.61	30151.54	30273.51	
Export	52852.35	56169.84	62791.38	62474.28	52527.09	51975.69	52010.68	
Balance	26055.25	27385.24	34632.31	34297.63	21388.48	21824.15	21737.17	
sugar								
Import	13185.51	13288.77	11844.09	10987.47	11624.3	12091.84	11921.44	
Export	9108.44	8757.3	8560.11	9711.14	9822.95	8436.13	8511.66	
Balance	-4077.07	-4531.47	-3283.98	-1276.33	-1801.35	-3655.71	-3409.78	
meat								
Import	4493.93	4673.47	4718.14	4773.72	5245.52	5066.71	5003.62	
Export	5975.12	5888.74	5724.8	5847.77	6239.38	6320.25	6112.99	
Balance	1481.19	1215.27	1006.66	1074.05	993.86	1253.54	1109.37	
OECD countries	wheat							
	Import	4197.82	3184.01	3321.09	4355.01	3793.06	2977.68	3429.94
	Export	47471.42	42797.3	48759.52	46570.1	49903.04	50346.09	50013.91
	Balance	43273.6	39613.29	45438.43	42215.09	46109.98	47368.41	46583.97
	soya							
	Import	1229.33	972.18	1162.8	1214.3	1511.72	808.24	820.17
	Export	52691.9	55838.34	62405.3	61998.13	52186.35	51578.32	51642.76
	Balance	51462.57	54866.16	61242.5	60783.83	50674.63	50770.08	50822.59
	sugar							
	Import	4369	4054	3429	3728	3650	4206	3972.6
	Export	154	92	85	105	60	60	60
	Balance	-4215	-3962	-3344	-3623	-3590	-4146	-3912.6
	meat							
	Import	2176.19	2268.28	2067.29	2034.5	2031.68	2066.13	2034.43
	Export	1877.32	1652.75	1836.2	1969.89	2117.89	2243.99	2304.56
Balance	-298.87	-615.53	-231.09	-64.61	86.21	177.86	270.13	
North America	wheat							
	Import	10461.06	12229.54	9791.84	10035.65	10655.56	9766.19	9819.32
	Export	70370.4	80295.79	77415.75	84124.14	76683.65	82245.42	89282.05
	Balance	59909.34	68066.25	67623.91	74088.49	66028.09	72479.23	79462.73
	soya							
	Import	10461.06	12229.54	9791.84	10035.65	10655.56	9766.19	9819.32
Export	70370.4	80295.79	77415.75	84124.14	76683.65	82245.42	89282.05	
Balance	59909.34	68066.25	67623.91	74088.49	66028.09	72479.23	79462.73	
Europe	wheat							
	Import	10461.06	12229.54	9791.84	10035.65	10655.56	9766.19	9819.32
	Export	70370.4	80295.79	77415.75	84124.14	76683.65	82245.42	89282.05
Balance	59909.34	68066.25	67623.91	74088.49	66028.09	72479.23	79462.73	
soya								

	Import	15972.55	17714.84	16648.45	16809.33	18447.28	18428.02	18358.16		
	Export	3008.68	3022.33	3731.86	3866.22	4310.51	3875.38	3886.05		
	Balance	-12963.87	-14692.51	-12916.59	-12943.11	-14136.77	-14552.64	-14472.11		
	sugar									
	Import	5418.51	5566.77	4608.09	3186.47	3507.3	3520.84	3445.94		
	Export	2971.44	2995.3	4137.11	5786.14	3812.95	4475.13	3717.85		
	Balance	-2447.07	-2571.47	-470.98	2599.67	305.65	954.29	271.91		
	meat									
	Import	1651.75	1440.66	1338.65	1337.87	1407.82	1351.99	1331.07		
	Export	1009.21	1102.42	1257.65	1305.53	1310.86	1245.31	1239.5		
	Balance	-642.54	-338.24	-81	-32.34	-96.96	-106.68	-91.57		
	Africa	wheat								
		Import	47411.72	48086.98	47888.51	48081.17	46708.27	47924.77	52086.81	
		Export	1510.92	1069.97	979.96	1034.96	1024.45	1037.95	1016.61	
		Balance	-45900.8	-47017.01	-46908.55	-47046.21	-45683.82	-46886.82	-51070.2	
soya										
Import		2921.78	2290.78	3419.78	4031.5	4675.5	5345.5	5882.33		
Export		142.48	95.48	100.48	202.48	209.48	179.48	176.81		
Balance		-2779.3	-2195.3	-3319.3	-3829.02	-4466.02	-5166.02	-5705.52		
sugar										
Import		14241.08	13501.66	16708.99	15352.59	13906.44	13591.55	14284.75		
Export		4722.2	4344.14	4692.28	4656.03	3892.06	3793.07	3937.1		
Balance		-9518.88	-9157.52	-12016.71	-10696.56	-10014.38	-9798.48	-10347.65		
meat										
Import		1242.47	1231.45	1006.3	908.89	835.16	852.53	852.13		
Export		430.4	345.05	351.62	305.02	397.21	270.15	274.96		
Balance	-812.07	-886.4	-654.68	-603.87	-437.95	-582.38	-577.17			
South America	wheat									
	Import	22163.04	22084.99	23908.01	24107.9	24579.9	24800.85	25318.74		
	Export	9181.12	12712.59	16619.92	13580.92	15378.85	16943.16	16901.43		
	Balance	-12981.92	-9372.4	-7288.09	-10526.98	-9201.05	-7857.69	-8417.31		
	soya									
	Import	6629.42	6708.37	7657.88	8800.34	14593.95	11118.29	8790.22		
	Export	75652.83	73449.68	86899.13	82159.19	88279.2	93137.14	93076.99		
	Balance	69023.41	66741.31	79241.25	73358.85	73685.25	82018.85	84286.77		
	sugar									
	Import	2249.17	2296.35	2290.53	2300.73	1819.93	1862.14	1887.55		
	Export	31486	36969	36717	28774	26896	29153	30902.67		
	Balance	29236.83	34672.65	34426.47	26473.27	25076.07	27290.86	29015.12		
	meat									
	Import	936.88	777.9	860.88	762.13	747.27	791.3	806.16		

	Export	3263.61	2875.81	2946.45	3275.75	3720.48	3890.91	4209.27
	Balance	2326.73	2097.91	2085.57	2513.62	2973.21	3099.61	3403.11
Asia	wheat							
	Import	78555.76	79592.93	90756.5	88138.3	84639.86	85581.6	92631.63
	Export	15203.02	16248.82	15785.09	17392.5	17257.52	14005.93	14552.85
	Balance	-63352.74	-63344.11	-74971.41	-70745.8	-67382.34	-71575.67	-78078.78
	soya							
	Import	99761.57	106123.92	117974.36	118952.14	109660.45	112861.52	115410.58
	Export	757.41	499.01	671.01	650.01	503.01	461.01	470.94
	Balance	-99004.16	-105624.91	-117303.35	-118302.13	-109157.44	-112400.51	-114939.64
	sugar							
	Import	29771.08	36563.29	34431.87	34889.62	31223.67	31807.4	34055.63
	Export	15540.25	18404.49	16007.75	20134.01	19470.28	17427.56	18760.06
	Balance	-14230.83	-18158.8	-18424.12	-14755.61	-11753.39	-14379.84	-15295.57
	meat							
	Import	5095.7	5019.39	5464.14	6005.99	6476.12	6842.46	6964.73
	Export	2485.29	2097.38	2023.28	2082.89	1922.51	2006.21	1998.26
	Balance	-2610.41	-2922.01	-3440.86	-3923.1	-4553.61	-4836.25	-4966.47

Source: calculated and built by the authors based on [25].

According to Table 1, the following conclusions can be drawn. During the analysed period, OECD countries are characterized by a positive balance for all studied goods, except sugar. The situation is similar in South America, where the grain industry is in short supply, while other groups of goods are produced in surplus. As for North America, the balance for wheat and soya was positive during 2014-2020, while the balance for sugar and meat was negative. Europe is characterized by a predominance of exports of wheat, and from 2017 — sugar, while imports of

soya and meat are significant during the study period. The data of Table 1 indicate the low export orientation of Africa and Asia. First of all, this can be explained by the peculiarities of natural and climatic conditions, which are decisive for the agricultural sector.

Let us analyse the situation on the international market for the main agricultural items, which will allow us assessing the external aspect of the export potential of each region. Figure 4 shows wheat exports in a generalized form.

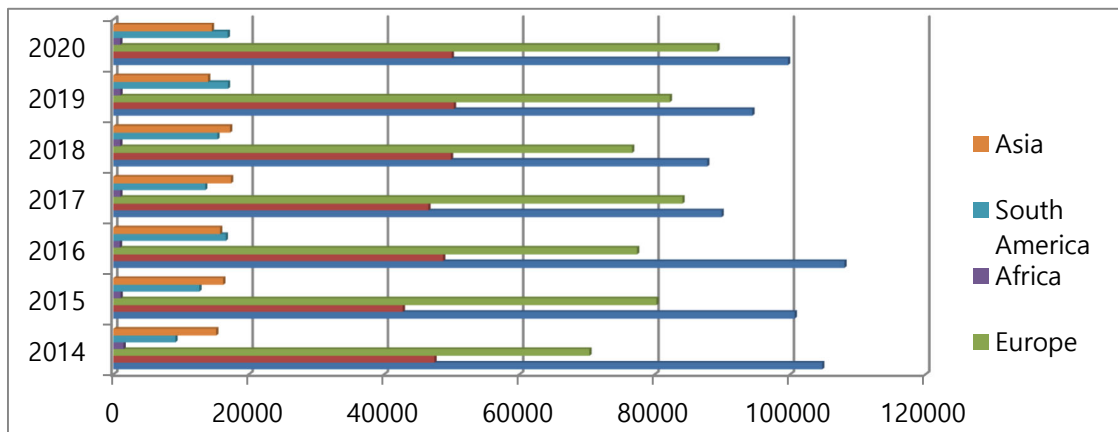


Figure 4. Wheat exports by regions for 2014-2020, thousand tons

Source: calculated and built by the authors based on [25].

According to the results, the leaders in the wheat export market are the OECD countries and Europe. At the same time, the largest volume of exports was in 2016, and the lowest — in 2018. African countries provide the smallest volume of wheat exports. As for soya exports, Figure 5 shows that its largest representative on the

international market is South America and with a significant gap between OECD countries. The peak periods of exports are 2019 and 2020. This trend can be explained by the popularization of soya not only as a food resource, but also its active use as a technical crop for the production of agricultural feed and biofuels.

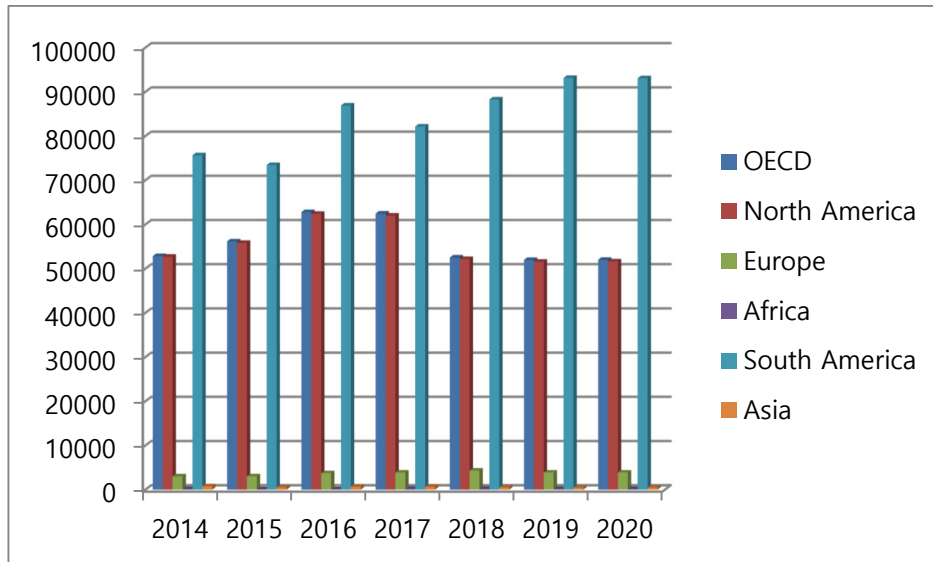


Figure 5. Soya exports by regions for 2014-2020, thousand tons

Source: calculated and built by the authors based on [25].

According to Figure 6, the countries of South America and Asia are the leaders in sugar exports. The largest exports volumes of this product fell at 2015-2016, and the lowest — at 2018.

Analysis of meat exports in 2014-2020 (Figure 7) indicates that the OECD and South America are dominant in this market.

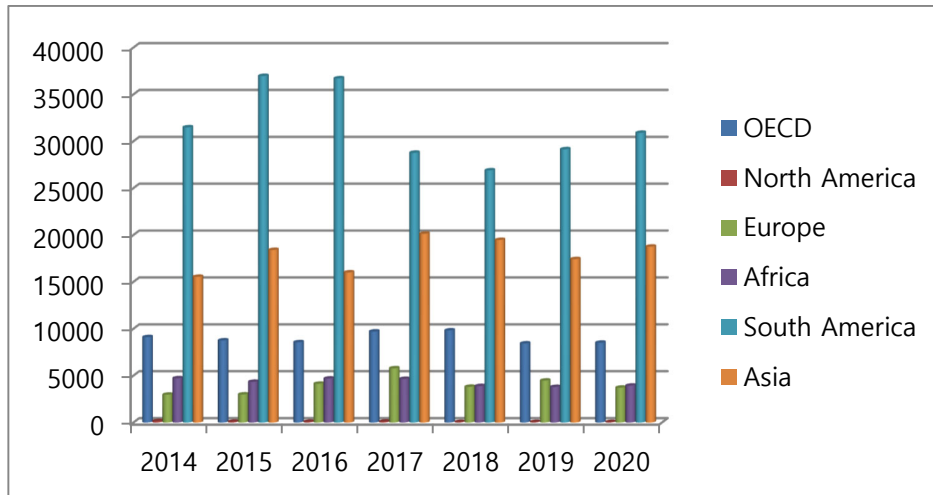


Figure 6. Sugar exports by regions for 2014-2020, thousand tons

Source: calculated and built by the authors based on [25].

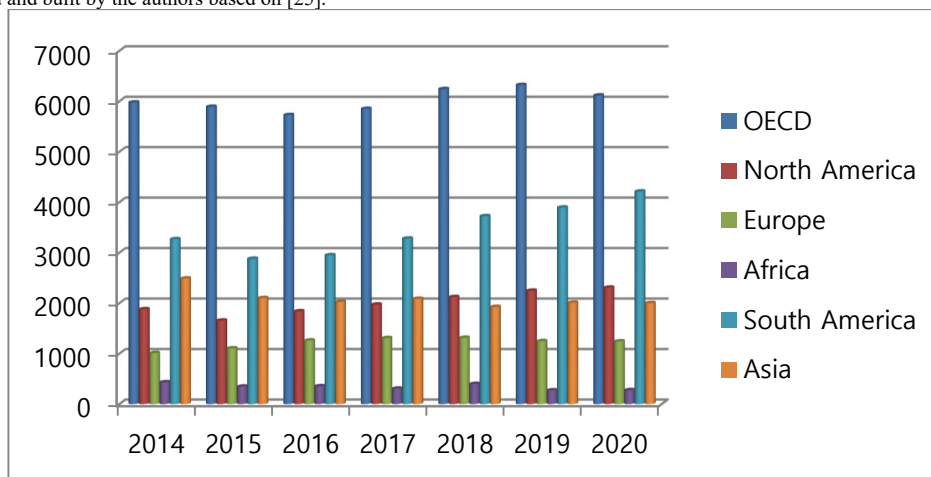


Figure 7. Meat exports by regions for 2014-2020, thousand tons

Source: calculated and built by the authors based on [25].

Thus, according to the results of the analysis, it should be concluded that the countries of South America, OECD, North America and Europe have the highest level of export potential. At the same time, African countries are import-dependent for all groups of studied agricultural products.

Analysis of domestic and foreign export potential of each region indicates that the export orientation of industries is largely determined by the favourable natural and climatic conditions for agricultural development, the established traditions of development of such industries and their type of market behaviour. Table 2 presents generalized

results of research of internal and external export potential by regions.

Table 2. Domestic and external export potential of agricultural products in the regional context

Product type	<i>Internal export potential</i> (positive balance of foreign trade)	<i>External export potential</i> (the dominant share of exports in the international market)
Wheat	OECD Europe North America	OECD Europe
Soya	OECD South America	North America South America
Sugar	Europe	South America Asia
Meat	South America	OECD South America

Source: compiled by the authors based on the results of the study

Based on the results obtained, it can be concluded that the export potential largely depends on the effectiveness of the development of its domestic component. However, according to Table 2, there is a situation when the region has a negative foreign trade balance, while providing a significant share of exports in the international market — this is a manifestation of the impact of economic activity of the countries in the region and their integration capacity in the context of minimizing the negative impact of the food crisis.

Thus, in order to provide food security, it is advisable to develop measures aimed at agricultural efficiency, expansion and improvement of agro-industrial

infrastructure, optimization of investment in export-oriented industries, taking into account domestic and foreign export potential of each country.

Let us analyse the impact of the following indicators on the wheat exports through the regression analysis: the area of sown land and the volume of consumption per capita. The calculations are based on the example of OECD countries, the leaders in wheat exports on the international market. Table 3 provides initial data for regression analysis.

The results of the regression analysis are as follows (Tables 4 - 5).

Table 3. Initial data for regression analysis

Years	Exports, thousand t	Land area, thousand ha	Consumption per capita, kg
2014	104,766	76,815.73	89.96
2015	100,705.9	76,210.27	89.62
2016	108,048.7	75,031.94	89.89
2017	89,902.18	70,172.88	90.69
2018	87,783.3	70,554.18	90.05
2019	94,436.12	70,758.89	90.02
2020	99,712.98	7,2282.1	89.98

Source: compiled by the authors based on the results of the study

Table 4. The results of regression analysis

Regression statistics					
Multiple R		0.855191225			
R-square		0.731352031			
Normalized R-square		0.597028047			
Standard error		4775.850117			
Observations		7			
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance of F</i>
Regression	2	248372940,9	124186470,4	5,444686854	0,072171731
Residue	4	91234977,34	22808744,34		
Total	6	339607918,2			

Source: built by the authors based on the results of the study

Table 5. Parameters for setting up the theoretical equation of linear regression

	<i>Coefficients</i>	<i>Standard error</i>	<i>t-statistics</i>	<i>P-value</i>	<i>Low 95%</i>	<i>High 95%</i>	<i>Low 95.0%</i>	<i>High 95.0%</i>
Y intersection	-24943.356	779748.556	-0.032	0.976	2189872.417	2139985.706	2189872.417	2139985.706
Variable X 1	2.230	0.929	2.401	0.074	-0.349	4.809	-0.349	4.809
Variable X 2	-446.867	8134.734	-0.055	0.959	-23032.510	22138.777	-23032.510	22138.777

Source: built by the authors based on the results of the study

Thus, the theoretical linear regression equation will be as follows:

$$y = -24943.356 + 2.230x_1 - 446.867x_2 \quad (1)$$

The value of the multiple correlation coefficient indicates that the obtained econometric model adequately describes the studied economic dependence. 73% of variations in the change in the performance indicator depend on factorial attributes. Regression analysis indicates an inverse correlation between the exports volume and the consumption of wheat per capita, and a direct correlation between the effective value and the area of land used for wheat cultivation. Thus, the model envisages the need to regulate the self-production of countries in the context of the development of export potential and promote the optimization of the use of natural resources that are strategic for agricultural development.

5. Discussion

Our results of the regression analysis of the impact of the sown land area and consumption per capita on the wheat exports volume are in line with a similar study conducted

by Khan [9]. Thus, they confirmed the short-term correlation between sown areas and crop production in terms of agricultural exports and between employment in agriculture and exports of agricultural products.

We agree with Koppenberg [26], expecting that fulfilling of the export potential of agricultural production during 2020-2021 will significantly transform in the context of the COVID-19 pandemic, in particular due to the impact of export bans imposed by some countries. Thus, the global food system will change significantly due to: reduced access to human resources (reduction of seasonal labour due to travel restrictions; staff morbidity and restrictions in public life); accumulation of stocks of agricultural products due to food insecurity, which is associated with the disruption of supply chains around the world; reducing demand for food due to reduced tourist flows; forced temporary shutdown of the economy, which led to a decrease in economic activity, a sharp rise in unemployment and, consequently, to a decrease in income, which may have an unpredictable impact on demand for agricultural products.

Thus, Espitia [27] analyse the impact of Covid-19 on world food markets. The initial shock caused by the pandemic is expected to result in decreased production of labour-intensive products due to morbidity and restrictions

for workers. Importing countries, which are largely developing and least developed, are projected to suffer the most.

Despite requests from international organizations, governments and trade economists to refrain from imposing trade-distorting measures, more than 20 countries have introduced bans on agricultural and food exports since the beginning of the COVID-19 crisis [26]. These export bans could adversely affect food security and disrupt established global supply chains.

The first attempt to quantify the effects of the current crisis in food markets was a study by the World Bank [27], which identified the directions of scientific research in this area. First, the Covid-19 industry impact analysis could be supplemented to take into account other factors that differ in the export of certain foods, such as differences in the sensitivity of time or in the production cycle of different crops. Similarly, the impact of supply shocks on prices will be mitigated by factors that vary by sector, such as the availability of buffer stocks. Second, the analysis is based on a partial equilibrium model, which does not consider the fact that food demand has also suffered from the crisis.

Therefore, it would be appropriate to adjust the results obtained in the study after the end of the pandemic for relevant data and to investigate the intensification of the food crisis in certain countries.

6. Conclusions

A single economic system is being formed in the context of globalization, which is characterized by asymmetric development of its elements due to the peculiarities and differences between countries in their integration process. The main objective is to ensure the effective functioning of economic systems and minimize the risks, as well as negative trends caused by global transformations. One of those urgent problems is to slow down and prevent the deepening of the global food crisis. It is necessary to study the export potential of agricultural production to ensure its acceptable level in the world. Thus, the processes of globalization and integration, as well as the pandemic intensify competition in the global food market.

Therefore, considering the fulfilment of their export potential the countries should identify measures to improve the efficiency of agricultural production, improve its logistics, investment support to increase competitiveness, intensify the sale of agricultural products to foreign economic entities.

Therefore, a new direction of research may be the implementation of the above strategic areas and their effectiveness not only in agriculture but also in related

industries, including engineering, food industry, other sectors of the economy, and the impact of the pandemic on the export potential of agricultural production.

References

- [1] FAO. (2017). The state of food and agriculture leveraging food systems for inclusive rural transformation. <http://www.fao.org/3/a-I7658e.pdf>
- [2] Lavriv, I. (2016). The factors affecting the export potential and its formation under the conditions of integration. *Baltic Journal of Economic Studies*, 2(2), 78–84. <https://doi.org/10.30525/2256-0742/2016-2-2-78-84>
- [3] Huai, D., Maeda, K., Wang, X. (2020). The impact of country reputation on export quality of agricultural products. *Journal of the Faculty of Agriculture*, 65(1), 193–199. <https://doi.org/10.5109/2558912>
- [4] Hoffmann, U. (2011). Assuring food security in developing countries under the challenges of climate change: key trade and development issues of a fundamental transformation of agriculture. UNCTAD Discussion Paper, 201. www.unctad.org/en/docs/osgdp20111_en.pdf
- [5] Turobova, H., & Kodirov, Az. (2016). The ways to increase the export potential of the farms. *International Journal of Innovative Technologies in Economy*, 4(6), 27-31. <https://ideas.repec.org/a/scn/033054/16947157.html>
- [6] Firlj, K., & Kubala, S. (2018). The assessment of export potential of agricultural and food products in the Visegradgroup countries in the years 2005–2017. *Economic Sciences for Agribusiness and Rural Economy*, 2, 167–173. <https://doi.org/10.22630/ESARE.2018.2.21>
- [7] Liefert, W. M., & Westcott, P. C. (2015). Alternative policies to agricultural export taxes that are less market distorting. ERR-187, U.S. Department of Agriculture, Economic Research Service. <https://www.ers.usda.gov/webdocs/publications/45373/err-187.pdf?v=1356.2>
- [8] Maximov, A., & Saha, D. (2017). Unlocking the export potential of Georgian agriculture. Policy Paper Series [PP/01/2017]. https://www.get-georgia.de/wp-content/uploads/2017/04/PP_01_2017_en.pdf
- [9] Khan, Z.A., Koondhar, M.A., Aziz, N., Ali, U., & Tianjun, L. (2020). Revisiting the effects of relevant factors on Pakistan's agricultural products export. *Agricultural Economics*, 66, 527–541. <https://doi.org/10.17221/252/2020-AGRICECON>
- [10] Osabohien, R., Akinpelumi, D., Matthew, O., Okafor, V., Iku, E., Olawande, T., & Okorie, V. (2019). Agricultural exports and economic growth in Nigeria: an econometric analysis. *Proceedings of the IOP Conf. Series: Earth and Environmental Science*, 331, 012002IOP. <https://doi.org/10.1088/1755-1315/331/1/012002>
- [11] Shokrollah, H., Moghaddasi, R., Zeraatkish, Y., & Mohammadinejad, A. (2020). An application of stochastic frontier gravity approach (the case of Iran's potential agricultural exports). *International Journal of Analysis and Applications*, 18(3), 482–492 <https://doi.org/10.28924/2291-8639-18-2020-482>
- [12] Pang, L., & Wang, Q. (2019). Statistical analysis of the impact of environmental regulation on china's agricultural products export. *Proceedings of the IOP Conference Series:*

- Earth and Environmental Science, 252(4). <https://doi.org/10.1088/1755-1315/252/4/042125>
- [13] Ferro, E., Otsuki, Ts., & Wilson, J.S. (2015). The effect of product standards on agricultural exports. *Food Policy*, 50, 68–79. <https://doi.org/10.1016/j.foodpol.2014.10.016>
- [14] Remeikiene, R., Gaspareniene, L., & Volkov, A. (2018). Evaluation of the influence of the export in agricultural products on the Baltic states economic growth. *Montenegrin Journal of Economics*, 14(3), 83–94. <https://doi.org/10.14254/1800-5845/2018.14-3.6>
- [15] Richardson, K., Chigozie, N. N., & Chinenye, E. I. (2020). Potential impacts of free trade areas and common currency on sustainable agricultural export in Africa. *Journal of Public Affairs*, e2392. <https://doi.org/10.1002/pa.2392>
- [16] Anania, G. (2013). Agricultural export restrictions and the WTO : What options do policy-makers have for promoting food security?. International Centre for Trade and Sustainable Development (ICTSD), Issue paper 50. <https://www.researchgate.net/publication/262560323>
- [17] Gilbert, C. L. (2012). International agreements to manage food price volatility. *Global Food Security*, 1(2), 134–142. <https://doi.org/10.1016/j.gfs.2012.10.001>
- [18] Headey, D., & Fan, S. (2010). Reflections on the global food crisis. How did it happen? How has it hurt? And how can we prevent the next one?. Research reports, 165. International Food Policy Research Institute (IFPRI). <https://ideas.repec.org/p/fpr/resrep/165.html>
- [19] Sidorskiy, S.S. (2014). Agroindustrial policy of the Eurasian economic union. http://www.eurasiancommission.org/ru/Documents/APK_in_g_n.pdf
- [20] Elbushra, A. A., Karim, I. E. A., & Suleiman, I. (2011). The role of COMESA in promoting intra- regional agricultural trade: Case study of Sudan. *Journal of the Saudi Society of Agricultural Sciences*, 10(2), 59–64. <https://doi.org/10.1016/j.jssas.2011.03.004>
- [21] Olayiwola, W., Osabuohen, E., Okodua, H., & Ola-David, O. (2015). Economic integration, trade facilitation and agricultural exports performance in ECOWAS sub-region. In M. Ncube, I. Faye, & A. Verdier-Chouchane (Eds.), *Regional integration and trade in Afric*. Palgrave Macmillan. <https://doi.org/10.1057/9781137462053.0012>
- [22] Shobande, O. A. (2019). Effect of trade integration on agricultural export performance in selected west African countries. *Economics*, 7(79), 1–14. <https://doi.org/10.3390/economics7030079>
- [23] Narayan, S., & Nguyen, T. T. (2016). Does the trade gravity model depend on trading partners? Some evidence from Vietnam and her 54 trading partners. *International Review of Economics & Finance*, 41, 220–237. <https://doi.org/10.1016/j.iref.2015.08.010>
- [24] Rahman, M. M., & Dutta, D. (2012). The gravity model analysis of Bangladesh's trade: A panel data approach. *Journal of Asia-Pacific Business*, 13, 263–286. <https://doi.org/10.1080/10599231.2012.687616>
- [25] OECD. (2020). *Agriculture and fisheries*. <http://www.oecd.org/agriculture/>
- [26] Koppenberg, M., Bozzola, M., Dalhaus, T., & Hirsch, St. (2021). Mapping potential implications of temporary COVID-19 export bans for the food supply in importing countries using precrisis trade flows. *Agribusiness*, 37(1), 25–43. <https://doi.org/10.1002/agr.21684>
- [27] Espitia, Al.; Rocha, N., & Ruta, M. (2020). COVID-19 and food protectionism: The impact of the pandemic and export restrictions on world food markets. *Policy Research Working Paper*, 9253. World Bank. <https://openknowledge.worldbank.org/handle/10986/33800>