Key Changes in Food Trade after COVID-19

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Abstract: There were key changes in food trade after COVID-19, especially in the countries of South-East Europe. The European agri-food supply chain, although severely hampered by the pandemic and its constraints, was able to cope with the pandemic to a considerable extent. The value of agricultural outputs in 2020 fell by 1.4% compared to 2019, but increased by 2.9% compared to the 2015-2019 average. The research aims to examine whether and, if so, in what way the COVID-19 restrictions have affected the foreign trade competitiveness of agri-food products in the countries included in the study (Balkan countries (EU and non-EU) and Hungary). Furthermore, to examine what is fundamentally characteristic of the agri-food competitiveness of these countries and whether it is true that processed products are more competitive in these countries. Based on data from the European Union, the FAO, and World Integrated Trade Solutions, we examined basic food production and trade data from 2015 to 2024. This study compares the performance of the countries studied before the COVID-19 pandemic and in the years affected by COVID-19, based on the calculation of the trend function and the Balassa index, and draws conclusions. Comparing the results with other comparative advantage measurement options, e.g. Hillman index, RTA, RC, or linear RXA.

Even though, in several cases, production and trade in the Balkan and Eastern European countries (Hungary, Romania and Bulgaria) decreased, no significant change was observed in the competitiveness of the main food products in the countries studied, where the competitiveness of the products was balanced, i.e. there was no significant difference in competitiveness between product categories. In most cases, we can speak of a competitive disadvantage or a slight advantage. One reason for this may be the transformation of global supply chains into local supply chains and a shift towards local production. Production was less affected by the epidemic, but international trade declined and underwent transformation, with countries at a competitive disadvantage experiencing a greater decline, and those at a competitive advantage experiencing a lesser one. This is supported by the fact that for countries with a product group that has a significant competitive advantage, this increase was even more pronounced between 2020 and 2022. In the case of other, less competitive products, the competitiveness value decreased in several cases. It is clear that the competitive disadvantage has deepened, and these competitively disadvantaged countries must adapt, for example, by investing, strengthening, and supporting local trade. Countries and products with a competitive advantage are less affected by the impact of restrictions, while those with a weaker competitive advantage are more significantly impacted. The study provides a better understanding for professionals involved in international food trade. It allows local stakeholders to manage potential risks and stabilize long-term benefits.

Keywords: COVID-19; food trade; competitiveness; Hungary; South-East European countries

1 Introduction

Competitiveness is an important concept in economics. The literature has interpreted competitiveness at several levels [1] [2], one of which is examining the competitiveness of different countries from a trade perspective. Béla Balassa, an economist residing in the United States, published in 1965 an index of comparative advantage, which serves as the basis for studies and research on international trade [3].

Since the environment is also very complex, it is necessary to use complex models to approximate reality. Thus, several parameters, up to 42, have to be taken into account to measure competitiveness [4].

In some cases, it is possible to utilize mathematics and statistical models [5, 6, 7]. Andrei et al. (2020) measured Romania's foreign trade competitiveness for the central destination countries between 2007 and 2016. Mutations in competitiveness from the concentration and restructuring of Romanian trade flows, relative to those of other EU countries, were identified and analyzed [8].

Competitiveness is the ability to trade products that mean better price, quality and quantity. International competition in the agri-food industry has undergone significant changes due to globalization. Furthermore, labor-intensive countries are losing competitiveness due to a lack of local added value and other development efforts [9].

However, the focus of these works is typically on industrial products. The number of studies on the agri-food sector is much lower. The reason for this may be that agricultural markets are closer to perfect competitiveness than other markets. There is relatively little literature dealing with the comparative advantages of food products. Typically, analyses focus on developed Western or European countries, with few studies addressing the situation in Eastern European countries, for example.

There is relatively little literature dealing with the comparative advantages of food products. Typically, analyses focus on developed Western or European countries, with few studies addressing the situation in Eastern European countries, for example [10].

Productivity and comparative advantages are positively correlated in most studies. Thus, it is argued that developed European countries have comparative advantages over less developed countries [11-13].

Another area to be examined is whether processed products have a greater competitive advantage than raw products [14] [15].

The next area to examine regarding COVID-19 is that, according to several studies, competitive advantages are not permanent, i.e., they change over time [16-18]. How did these advantages change in the countries studied during COVID-19?

This article aims to analyze the competitiveness of food trade in Eastern European countries, including those awaiting EU accession, to examine how these competitiveness indicators have changed since the Covid-19 pandemic, and to explore the possible reasons behind this.

One of the research's sub-goals is to examine the extent to which it was true in these countries that processed products were more competitive than raw materials.

The countries analyzed were as follows: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the EU-27 average, Greece, Hungary, Montenegro, Macedonia, Romania, Serbia, and separately, the average for the Western Balkan countries. The years available are 2013-2024. The uniqueness of the article lies in the fact that no research has yet been conducted to examine the competitiveness of the listed countries during the COVID-19 period.

2 Materials and Methods

Balassa presented the original index of comparative advantage in a study published in 1965, which was defined as follows:

$$B_{ij} = RCA_{ij} = \left(\frac{X_{ij}}{X_{it}} \right) \Big/ \left(\frac{X_{nj}}{X_{nt}} \right) \tag{1}$$

Where x represents exports, i a given country, j a given product, t a group of products, n a given group of countries [3].

It follows that the index of comparative advantage or disadvantage manifested by product exports to reference countries is determined by comparing the share of a country's product exports in the total exports of that country with the share of product exports of the reference countries in total exports. If B > 1, then the country has a manifest comparative advantage over the reference countries; otherwise, it has a manifest comparative disadvantage.

A partial solution to the latter problem is the possibility of classifying the B index, developed by Hinloopen-van Marrewijk [19]:

Category A: $0 < B \leq 1$

Category B: $1 < B \leq 2$

Category C: $2 < B \leq 4$

Category D: $4 < B$

Category A includes those product groups that have no comparative advantage, Category B those that have a weak comparative advantage, Category C those that have a medium comparative advantage, and Category D those that have a strong comparative advantage.

The Balassa index has been criticized in particular for neglecting the effects of different economic policies (agricultural policy) and for asymmetric values. Various state interventions and trade restrictions distort the trade structure. The asymmetric value of the B index means that if a country has a comparative advantage in a product, the index values range from one to infinity, but in the case of comparative disadvantage, the values range from zero to one, which leads to an overestimation of the relative importance of a given sector [20].

One of the many criticisms of the Balassa index is that it does not account for, for example, the trade-distorting effects of agricultural policy interventions or various restrictive measures, and thus fails to represent comparative advantage [21] adequately. Hillman [22] examined the relationship between the B index and comparative advantages. He also demonstrated the insensitivity of the B index to production costs.

It can be seen that the scale for comparative advantage ranges from 1 to infinity, while for comparative disadvantage, the scale is between 0 and 1, hence asymmetric. In response to criticisms, several modifications have been introduced, e.g., RCA; however, the correlation between the original Balassa index and its transformations is so high that the use of the latter typically does not yield new results [23].

Based on empirical research, Marchese–de–de–Simone [24] developed the following formula:

$$HI = (1 - X_{ij}/X_{jn})/X_{ij}/X_{ii}(1 - X_{ii}/X_{in}) \quad (2)$$

If HI > 1, then index B is suitable for measuring comparative advantage. The authors [25] examined how the HI>1 condition applies to export and import data. In the case of imports, there is little difference between the Balassa index and the calculated values. Thus, the B index works reliably, while in the case of export data, the difference is greater. This is most evident in the case of raw material production and in sectors that rely heavily on natural resources. The Hillman condition is a standard diagnostic test.

To overcome the disadvantages of the B index, Fertő [26] recommends Vollrath [27]'s three formulas. These are: relative trade advantage index, logarithm of relative export advantage, and relative competitiveness.

The relative trade advantage index (RTA) considers both the export and import sides, representing the difference between the relative export advantage index (RXA) and the relative import advantage index (RMA). Formally expressed as:

$$RTA_{ij} = RXA_{ij} - RMA_{ij} \tag{3}$$

where RXAij = Bij and RMAij = (mij /mit)/(mnj /mnt) (m denotes imports), i.e.

$$RTA_{ij} = [(x_{ij}/x_{it})/(x_{nj}/x_{nt})] - [(m_{ij}/m_{it})/(m_{nj}/m_{nt})] \tag{4}$$

Interpreting its meaning, if RTA > 0, then a country has a relative trade advantage compared to the countries examined (reference countries); otherwise, it has a trade disadvantage. This index is closer to the concept of comparative advantage in that it considers both demand and supply effects. A further interpretation is that the higher the value, the more competitive a country is perceived to be.

Vollrath's second index for measuring manifested comparative advantages is the logarithm of relative export advantages (lnRXA), and his third index is called relative competitiveness (RC), which is the difference between the logarithm of relative export advantages and the logarithm of relative import advantages:

$$RC_{ij} = \ln RXA_{ij} - \ln RMA_{ij} \tag{5}$$

Positive lnRXA and RC indices indicate a competitive advantage, while negative values indicate a competitive disadvantage. Compared to the first two indicators, the advantage of using these indices is that they are symmetrical about the origin. Another advantage is that they account for trade distortions on both the export and import sides and are capable of handling intra-industry trade. The latter advantage is, of course, also a disadvantage of the RC index: if there is no intra-industry trade, the indicator cannot be interpreted [23, 26, 27].

To ensure the completeness of my research, I calculated and interpreted each indicator.

The weight and role of agriculture and agricultural trade are presented using the FAO (Food and Agriculture Organization of the United Nations) and the WTO (World Trade Organization) databases [28] [29].

The source of the trade data used to calculate the Balassa Index was the World Bank's WITS (World Integrated Trade Solution) database [30]. The data were downloaded at the HS-2 (Harmonized System) level for agricultural products (chapters 1-24) for the periods 2015-2019 and 2020-2024.

The structure of the products encompasses items ranging from live animals to Tobacco and manufactured tobacco substitutes. Some data was missing from the WITS database. Approximately 15 pieces in total from the export and import tables. Here, we use linear interpolation to estimate the missing data.

The Balassa index is calculated for the world, the total of all countries, the total of the EU-27 countries, and Hungary, as well as Western Balkan countries such as Albania, Bosnia and Herzegovina, Montenegro, Macedonia, Kosovo, and Serbia. However, it should be noted that data for Kosovo were unavailable and had to be excluded from the analysis. The other Balkan countries, such as Bulgaria, Croatia, Romania, and Greece, are included in this research, and a new category, Western Balkan countries, is introduced. Where only some data were missing, they were filled in by linear extrapolation. The WITS database contains complete data up to 2024 in all product categories; therefore, the Balassa index calculation was based on 2024 data, as it was the most recent year available. In the case of Serbia, the last full year was 2023.

To measure changes over time, linear trend values were calculated for both actual turnover data, which are in thousands of US dollars. To measure the change in competitiveness, we also calculated linear trends for the Balassa indices. The difference between the trend values and the actual values shows the direction of change. If the actual value exceeded the trend value, then exports and competitiveness increased over the COVID-19 period; if there was a decrease, then exports and competitiveness per product decreased. Checking the robustness of the trend function involved using regression and correlation.

3 Results and Discussions

The response to the COVID-19 outbreak has typically led to a decline in various economic indicators. According to available statistics and data, by March 2020, there had been a significant decline in GDP, consumption, consumer confidence, construction, industry, prices and unemployment in many areas. As shown in Figure 1, GDP decreased by more than 10% in some countries.

Governments have reacted differently to the crisis, which may have contributed to its worsening. The benefits of market efficiency, diversification and hedging became unpredictable and their value questionable due to contagion and spill-over effects on different markets [32]. The pandemic has exacerbated inequalities between and within countries, reversing trends in poverty reduction. Increased global uncertainty and higher costs in international transactions have emerged [33].

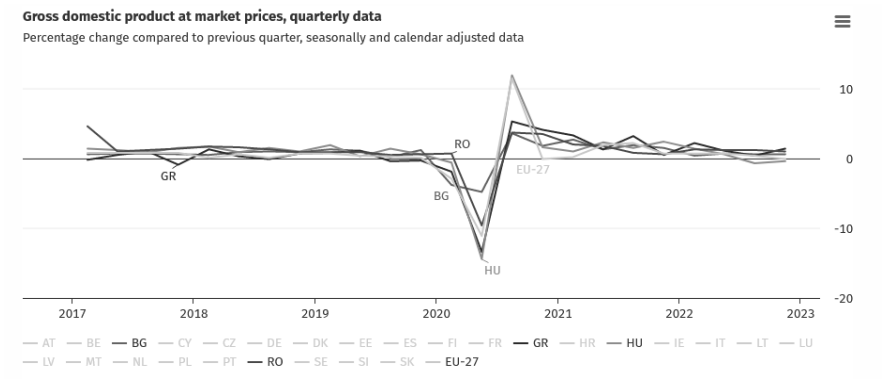

Figure 1
GDP at market prices, quarterly data, Greece, Hungary, Bulgaria, Romania. Source: [31]

Many sectors have been affected by the cuts. It has affected individuals and households, as well as tourism, travel, and transport, the environment, globalization, trade, and the economy. Negatively affected education and households. However, it had a positive impact on the environment due to the downturn [34]

There is evidence of a decline in microeconomic indicators. Unemployment has increased, incomes have fallen, health care expenditure has increased, household expenditure has increased, productivity has fallen, mental stress has increased, consumption has fallen, and so on. The global financial crisis, as well as supply and demand, capital market volatility, fiscal policy turmoil, monetary policy, air transport, international tourism and hospitality, and world trade, have all had a significant impact [35]. During the COVID-19 crisis and intense competition, agro-processing enterprises were also vulnerable to financial insolvency [36].

The Balkans are a region rich in natural resources. Its diverse topography, geological diversity and variety of habitats have created the basis for a complex, multi-faceted economic activity. The mining of hydrocarbons, coal, iron ore, various non-ferrous metal ores and building stones is carried out. The varied, fertile soils and favorable climate have given rise to a diversified agricultural sector. For most of its history, however, nature has revealed its harsh side to its inhabitants. The exploitation of resources is primarily a consequence of the modernization period of the 20th century [37].

Most Balkan countries have a relatively high agricultural potential. The share of agricultural land is close to or above the EU average of 40%. However, except Serbia and Croatia, which have large arable areas, all other WB countries have a larger share of permanent grassland as a percentage of total agricultural area, ranging from 40% in Albania to over 90% in Montenegro (compared to 30% in the EU-27). A significant part of the WBs is mountainous and hilly or karstic, and

thus less favorable for agriculture. Regions with these characteristics are subject to significant ageing and depopulation processes, which may hamper the development of agriculture in these areas. In large parts of the country, a significant part of the agricultural land is underutilized [38]

Comparative analysis of circular agriculture development in selected Western Balkan countries based on sustainable performance indicators [39]. At the same time, these countries can gain a competitive advantage in many areas [40]. In general, these countries have a positive balance compared to EU countries [41]. As shown in Figure 2, other manufactured goods are the leading export products to the EU, followed by machinery and vehicles. The share of food and drinks is less than 10%.

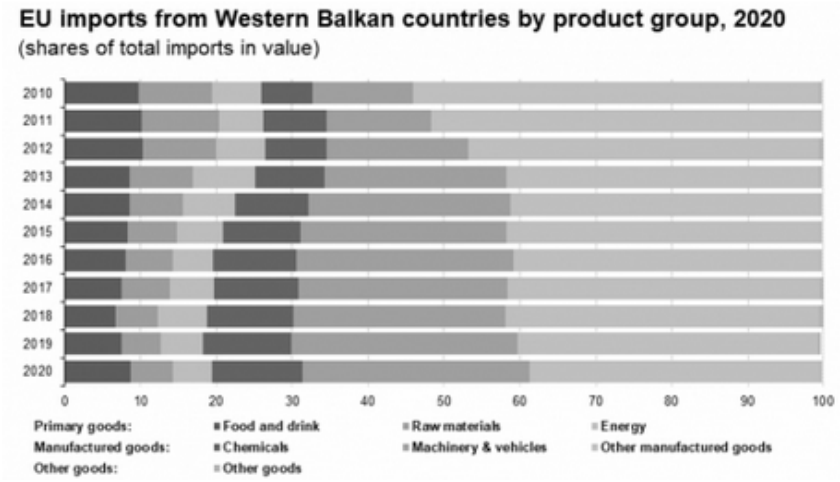

Figure 2
Western Balkan countries' exports by groups 2020 Source: [41]

The food industry and agriculture are sensitive to changes in foreign markets to a certain extent. Food processing industries are more sensitive to the dynamics of international trade than primary agriculture, i.e. raw material production is less exposed to international shocks and changes than the production of processed products itself [42].

The data in Table 1 clearly shows the structure of agri-food exports and imports in the Balkan countries compared to Hungary and the EU-27. Unprocessed products are the leading export products, while processed products already feature more heavily in imports. Cereals dominate Hungary's exports, while imports are more balanced. The structure of EU-27 exports and imports is also more balanced.

Table 1
Main export and import product groups of Western Balkan countries, Hungary, and EU-27, in percentage, 2015-2024. Source: [30]

	Edible vegetables	Cereals	Animal/veg fats & oils	Prep. of cereal, flour	Prep of vegetables, fruits, and nuts	Edible fruits	Beverages, spirits and vinegar
WB Export	5.5%	11.4%	6.2%	6.1%	4.4%	15.6%	8.3%
WB Import	3.3%	4.8%	5.1%	7%	3.7%	7.3%	9.1%
HUN Export	2.8%	14.7%	7%	3%	5.8%	1.4%	7.6%
HUN Import	4%	4.1%	5.2%	6.7%	4.1%	4.6%	5.2%
EU-27 Export	4.5%	4.3%	5.2%	7.2%	4.7%	5.1%	12.1%
EU-27 Import	5%	4.1%	6.5%	5.2%	4.7%	8.3%	7.6%

Comparative Advantages

Before performing Balassa index calculations and analyses, we must calculate whether the Hillman condition is met. This is because if this index is less than 1, we cannot reliably use the Balassa index to measure comparative advantages. Due to space constraints, it cannot be displayed here, but for every period, country, and product, this indicator exceeds 1, thus providing a reliable picture of the Balassa index.

Table 2
The comparative advantages of agri-food products in Western Balkan countries based on the data for 2015–2024. Correlation values, own calculations.. Source: [30]

	B_RTA	B_LnRXA	B_RC	RTA_ LnRXA	RTA_RC	LnRXA_ RC
2015	0.86	0.85	0.72	0.64	0.83	0.81
2016	0.90	0.84	0.61	0.73	0.79	0.78
2017	0.88	0.85	0.68	0.70	0.83	0.81
2018	0.82	0.84	0.68	0.63	0.84	0.80
2019	0.82	0.86	0.64	0.68	0.86	0.75
2020	0.88	0.85	0.62	0.72	0.82	0.74
2021	0.86	0.86	0.62	0.68	0.84	0.71
2022	0.86	0.84	0.66	0.66	0.81	0.79
2023	0.79	0.86	0.57	0.66	0.85	0.72
2024	0.50	0.93	0.52	0.47	0.90	0.57

The data summarized in Table 2 are the results of consistency and stability tests. Based on these, there is a strong correlation between the Balassa index and the RTA index for all years except 2024. The same is true for the Balassa index and

the linear RXA; however, in that case, a strong correlation is calculated for every year. The correlation between the Balassa index and the RC is moderate, with some consistency. Similarly, moderate values can be found between the results of the RTA and the linear RXA. There is also a strong correlation between the RTA and RC figures, while the correlation between the linear RXA and RC data is strong but with slightly lower values. Overall, we obtained moderate to strong consistencies, meaning that in most cases the Balassa index accurately reflects comparative advantages in the countries and periods examined. The data show that the structure of comparative advantages changed after 2023. A similar phenomenon can be observed in domestic data, whereas EU-27 data are more stable and have not shown such a change.

The main export products to the EU are dairy products, eggs, edible vegetables, edible fruits, cereals, fats, oils, prepared cereals, beverages, other preparations and products. If we compare the trend function data and real data, except for mill products, other vegetable saps, sugars, edible preparations, and beverages, there is no decline; therefore, the value of exports increased compared to the trend in 2020. From 2021, there has been a decrease in some categories. Edible vegetables, oil seeds. There is an increase in specific categories, including oils, sugars, cereal flours, and cocoa. Volume changes in the world's exports also exist in some categories. In this Category, we can see a greater significant decline in volume. Meat, fish, edible vegetables, mill products, and the preparation of meat, as well as beverages. We can observe positive changes in the preparation of edible foods, oils, cereals, fruits, live animals, and dairy products.

The remainder of the analysis follows this structure. The country's main products are presented, followed by a trend analysis and comparison. The results of the Balassa index are presented, and a trend analysis is conducted to assess competitiveness. Albania is the first country to be analyzed. The main product exports are shown in Table 2. For most products, there was no decline in 2020, which was the first year of the COVID-19 pandemic in terms of its impact. The main decline is in the tobacco category. There was a slight decrease in the preparation of meat and cereals categories. In 2020, the difference between the trend and actual data indicates a decline in 11 categories, totaling 24. Meat, preparations of meat, and cereals have the largest share, but there was an increase in the fish, oils, seeds, and preparation of vegetables categories.

Albania has Category A products as follows. Live animals, meat, dairy, live tree, coffee, cereals, mill products, gums, vegetable products, fats, oils, sugars, cocoa, preparation of cereal, edible preparations, beverages, waste and Tobacco. Category B is fish, edible fruits, and preparations of fruits. Category C is oils, seeds, and meat preparations. Category D is edible vegetables. The last Category has to be exported. In competitiveness, we can see an increase in animal products and oil seeds, but there is a decrease in the preparation of fish and meat. This means that animal products and oilseed are the winners of COVID-19 in Albania.

Bosnia and Herzegovina has a primary output, including meat, dairy, edible fruits and vegetables, oils, fats, the preparation of meat and vegetables, and beverages. According to differences, there is a decrease in some categories, such as live animals, mill products, meat, edible fruits, fats, oils, sugars, beverages, and Tobacco. In the other categories, we can see increases.

Bosnia and Herzegovina has a lot of Category A products. Category B is dairy products, mill products, fats and oils, meat preparations, sugars, and preparations of cereals. BIH does not have category C and D product groups. Preparations of meat and cereals had increased in competitiveness, but other main categories lost their Balassa index value.

Bulgaria has a stronger agri-food output. Cereals reach a billion USD in export activity. We can see a decline in live animals, meat, fish, other animal products, edible fruits and vegetables, coffee, gums, and preparations of meat and cereals compared to trend values. The values of other products, such as cereals, increased in competitiveness during the COVID-19 pandemic. Bulgaria has several advantages in competitiveness. The number of Category A is few: fish and gums. We can find in the Cat. B is a live tree. Cat C contains animal products, edible fruits, and vegetable materials. The other products are in Category D. Bulgaria has a significant competitive advantage. Line animals, meats, animal products, edible vegetables, gums, and preparations of cereals showed a decrease in 2020. The volume of these was a little.

Croatia's strongest export products are cereals, preparations of cereals and edible preparations. There was a decrease in the consumption of meat, dairy products, live trees, coffee, mill products, oils, fats, sugars, beverages, and Tobacco. In contrast, Croatian cereals have seen a significant increase in value between 2020 and 2022. The Croatian agrofood business is not divided into many categories. C and D groups, except for live animals, which were categorized as Cat. D, fish, and different preparations were Cat. C. During the COVID-19 pandemic, Croatian competitiveness increased in live animals, fish, and various preparations. We can see that the strongest products kept their positions.

The EU-27 comprises many countries; therefore, it is not possible to analyze them properly. Greece has a stronger agrofood sector. Different preparations, fish, dairy products, fruits, oils, and prepared vegetables are the main export products.

Very few Greek exports have bucked the trend. Live animals, meat, and sugars are the only products that have shown this. All other product groups have been able to increase their exports, showing no signs of stopping. Cat. A consists of basic products as live animals, meat, products of animals, coffee, cereals, mill products, prepared meat, vegetables, sugars, and cocoa. Cat. B consists of edible vegetables, gums, prepared cereals, and beverages. Cat. C consists of fish, fats, oils, and edible preparations. Cat. D is dairy products, edible fruits, prepared vegetables and fruits, and Tobacco. There was no significant drop in competitiveness in the years under review. The competitiveness of dairy products may fall sharply in 2022.

Hungarian agriculture and the food industry also have their strengths. In addition to staple foods, residues and beverages are also a significant source of export value. During the COVID-19 pandemic, animal products, edible vegetables, and live trees experienced a more significant decline. However, exports of cereals increased significantly.

Except for live animals, cereals, and residues, there are no Category C exports; most products fall into Categories A and B. This may be the reason for the lack of significant change in competitiveness from 2020 to 2022.

Montenegro has no strong official export product. There was a decline in prepared products and beverages compared to the trend, but Tobacco, beverages, and prepared meat are in the Category. D in competitiveness. Edible fruit, cocoa and meat mean Cat. C. Animal products, edible vegetables, and coffee mean Cat. B. The other group is Cat. A. Therefore, there was no significant change in competitiveness during the COVID-19 pandemic.

The most valuable products of Macedonia are edible fruits, vegetables, prepared cereals, beverages and Tobacco. Strong exports have not declined and have increased relative to trend. Fish, dairy products, live trees, cereals, and prepared cereals declined in consumption. The decline in the latter may be surprising as it represents a significant export. Edible fruit had the most significant increase. Nevertheless, Tobacco has the highest competitiveness indicator. It is the only category D product. Cat. Carefully prepared cereals and vegetables, a live tree. Edible fruit is a Cat. However, other groups are Cat. A. Except for Tobacco, which increased, there was no significant change in competitiveness from 2020 to 2022.

We can see the most important product groups in Romania—basic food and Tobacco. There was a significant increase in the value of tobacco exports in 2020. However, in general, there was a substantial decrease in most products compared to the trend. Most products have comparative disadvantage. There is no Cat B. product. Cat. C is an oilseed. Cat. D are live animals, cereals, and Tobacco. Except for Tobacco, there was a significant shift in competitiveness during the COVID-19 pandemic. Tobacco makes a significant increase in this aspect.

Serbia has a stronger edible fruit export, as well as a significant presence in beverages, preparations, residues, and Tobacco. The highest volume is cereals. The most significant decreases were in meat, fish, edible vegetables, mill products, prepared meat, and vegetables. The most significant increases were in cereals and Tobacco. Meat, fish, prepared meat, and gums are the only Cat A products. Live animals, sugars, prepared cereals, beverages, and residues are Cat. C and edible fruits, cereals, mill products and Tobacco are Cat. D. Other products are Cat. B. There was no significant difference compared to the trend. Finally, in Table 3, we can see the latest full-year data for some countries.

Table 3
Balassa indexes of countries' correlations before and after the COVID-19 pandemic. Own calculations. Source: [30]

	Correlation (2015-2019 vs. 2020-2024)	Correlation (2015-2019 vs. 2020)
Albania	96.3%	97.5%
Bosnia and Herzegovina	77.0%	78.3%
Bulgaria	88.4%	93.9%
Croatia	92.2%	92.1%
EU-27	98.3%	99.4%
Greece	99.2%	99.5%
Hungary	94.3%	93.8%
Montenegro	91.6%	88.2%
Macedonia	98.3%	99.5%
Romania	98.0%	94.2%
Serbia	96.7%	97.0%
Western Balkan	97.8%	97.5%

Comparing the Balassa indices (Table 3), we observe that in most countries, there was no significant difference in competitiveness before and after the COVID-19 pandemic. Only Bosnia and Herzegovina showed a weaker correlation, as the competitiveness indicators of several products increased, while those of others decreased, resulting in a difference in competitiveness.

Albania has some products with high competitiveness (edible vegetables, meat preparation) and others with low competitiveness (cereals, sugars, animals, and so on). Out of the 24 product categories, COVID-19 negatively impacted competitiveness in 9 cases and had positive effects in 15 cases.

Bosnia and Herzegovina does not have high-level competitiveness in production, but it does have some products that are uncompetitive (live animals, sugar, and Tobacco). Ten product groups hurt competitiveness, while other products have a positive impact.

Bulgaria has many products with high competitiveness (cereals, animal products, fats, cocoa, Tobacco, and waste), and only a few have negative ones. COVID-19 affects only some products negatively (animals, meat). Most products were winners of COVID-19.

Croatia has only a few strong products in terms of competitiveness: tobacco and live animals. The country has a lot of uncompetitive products, and 12 product groups were the losers of the epidemic.

Greece has some strong product groups in terms of competitiveness (dairy, edible fruits and preparation of vegetables), but it also has less competitive products. Only 8 product groups fell during the epidemic.

The EU-27 has a few strong products, but the pandemic had a positive impact on competitiveness.

Hungary does not have any products with highly competitive features. But more with uncompetitive features (fish, coffee, Tobacco). Only nine groups were affected by the epidemic.

Montenegro's Tobacco, beverages and meat preparation have strong competitiveness, and some products have low competitiveness (coffee, fats, fish). Some (5) product groups have an adverse effect during COVID-19. Others were winners.

Macedonia has only Tobacco with strong competitiveness, but it has a lot of uncompetitive products. The epidemic can cause relatively positive effects.

Romania has some products with strong competitiveness, such as live animals, Tobacco, and cereals, while others are less competitive, including fish, live trees, and sugars. The effect of the epidemic was relatively positive.

Serbia has a Competitive Advantage in Tobacco, cereals, and edible fruits, while meat, fish, and coffee are less competitive. The effect of the epidemic was relatively positive.

To examine whether there is a difference in competitiveness between processed and unprocessed products, I performed a correlation analysis. In the case of Serbia, I found a moderately strong correlation, while in all other countries, the competitiveness of one or the other was higher. In Albania, the competitiveness of processed products is higher, mainly due to the high comparative advantage of processed meat products. The situation is similar in Bosnia, but there is no such outstanding product group there. In Bulgaria, there is also a difference between the competitiveness indices. Cereals and oilseeds enhance the competitiveness of raw materials, which are more competitive in this market. In Croatia, processed products are more competitive, whereas in the EU-27, no correlation is found. In Greece, the picture is also unclear, as the competitiveness of unprocessed fruit and processed dairy products is high. Therefore, no significant difference could be detected. No such correlation could be detected for Hungarian products, while in Montenegro, the competitiveness of unprocessed products is higher. In Macedonia, unprocessed products are also more competitive. We see the same thing in Romania. In Serbia, processed products have a comparative advantage, while in the Western Balkan countries, the picture is also mixed, but processed products tend to be more advantageous.

Discussion

Numerous studies have found that processed products have a competitive advantage over unprocessed products in the market. Mizik (2021) found that EU-15 countries have a comparative advantages on processed goods [12]. Mzik et al. (2020) realized that in ASEAN region processed food have positive completive

advantages [10]. Harmonizing production processes can increase competitive advantage [43]. The German and Dutch examples show that processing can increase positions in export markets [44]. Mizik et al. (2020) found that in CIS countries process food had comparative advantages vs. unprocessed food [45]. According to my calculations, this was partly true. It was not the case in all countries. It was true in Serbia and Croatia, but not in Montenegro, for example.

Hungary, like other Balkan countries, tends to be successful and has advantages in areas where it has good production conditions, such as cereals. Foreign trade indicates that Hungarian agri-food exports have a high proportion of raw materials and low value-added products, which is a long-term disadvantage [10, 12, 46]. The other major problem is a lack of capital, resulting in minimal investment, which means that most products are sold domestically and unprocessed products are exported out of necessity [47].

The agriculture sector in most Balkan countries suffers from a similar lack of capital [48].

COVID-19 has had an impact on the food industry. Depending on the product category (raw materials versus processed products, perishable goods versus non-perishable goods, etc.), the COVID-19 crisis has impacted trade. The deeper the integration, the better it protected producers. Grain exports and meat imports characterize the Hungarian product range [49].

The crisis highlighted the problems faced by companies, including a lack of capital, insufficient knowledge, and market issues. It had an impact, but not all companies were able to respond appropriately, which also affected their competitiveness [50].

Conclusions

The paper analyzed the impacts of COVID-19 on agri-food trade in Hungary and the Balkan countries. COVID-19 did not impact all products equally. And not all countries or products, were affected in the same way.

In conclusion, COVID-19 had a positive effect on the WB Countries. For most products, the competitive advantage has increased compared to the trend. Moreover, only a few products showed losses.

Figure 3 shows the relationship between changes and the Balassa index by country and by product.

Furthermore, in this article, we examined the agri-food competitiveness of South-Eastern European countries in the context of COVID-19. It became clear for each country which product groups represent a competitive advantage, i.e. which ones are worth supporting and developing.

It provides policymakers with information on which products are advantageous for each country.

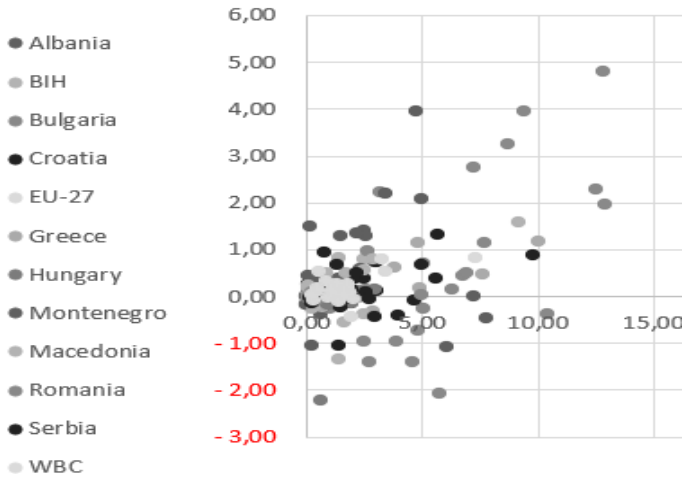

Figure 3
Map of Balassa indices and changes in 2020. Own calculation.

Each of the countries examined has a different product structure. What they have in common is that unprocessed products characterize production; however, in Serbia, for example, processed products offer a greater comparative advantage.

Several countries in this region, such as Hungary, export raw materials and import processed products. The Balassa indices also indicate that the comparative advantage is decreasing from raw materials to processed products, although this was not evident in all countries. There are countries, such as Montenegro, where unprocessed products have a greater competitive advantage, although this is not absolute in international competition. It represents a low advantage.

It has been proven that when applying the Hillman condition, as a standard diagnostic test, recommended by international literature, no non-compliance can be observed, which makes the B index suitable for demonstrating the comparative advantages of the agri-food sector in the countries examined. This result is also consistent with currently known empirical findings.

The stability and consistency of the RCA indices supported the validity of the above results; thus, the RCA indices can be used to analyze the international competitiveness of agri-food products.

The results also showed that, in general, COVID-19 did not significantly impact competitiveness. It only caused changes in individual products, but did not impact a country's overall competitiveness. This showed that comparative advantage is structural and therefore difficult to change.

It has not been demonstrated in general terms that processed products offer a greater competitive advantage in all of these countries.

In most cases, we can speak of a competitive disadvantage or a slight advantage. One reason for this may be the transformation of global supply chains into local supply chains and the shift towards local production. Production was less affected by the pandemic, but international trade declined and underwent significant changes. Countries at a competitive disadvantage experienced a greater impact, while those at a competitive advantage, experienced a lesser impact. This is supported by the fact that in countries with a product group with a significant competitive advantage, this advantage grew even further between 2020 and 2022. In the case of other, less competitive products, competitiveness declined in several cases.

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