



The analysis of vegetable and fruit export competitiveness of the Republic of Srpska

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Abstract

The aim of this research is an analysis of the Republic of Srpska's export competitiveness in vegetables and fruit on international markets. Two main evaluation indices were used, namely the trade competitiveness (TC) index and the revealed comparative advantage (RCA) index to measure and analyze the international position of vegetables and fruit during 2015 – 2022. Both indicators were calculated based on statistical data on foreign trade in vegetables and fruit between the Republic of Srpska and the world, EU, and CEFTA countries, and analyzed using descriptive statistics. Vegetables and fruit participate with 7.17% and 15.41% in the total export of the Republic of Srpska's agri-food sector. Analysis of the export structure of this sector showed an average share of vegetables and fruit of 12.04% and 9.43% in the EU market, i.e., 1.63% and 9.65% in the CEFTA market. The results indicate strong export competitiveness of the Republic of Srpska in vegetables concerning the world and EU markets, but weak export competitiveness in relation with the CEFTA countries. The Republic of Srpska recorded strong export competitiveness in fruit on the world and CEFTA market, while poor export competitiveness in the EU market. Within these two product groups on the world market, cucumbers, apples, pears, and plums achieved strong export competitiveness. Cucumbers and plums were two leading products regarding strong export competitiveness On the EU market, while apples and pears were on the CEFTA market. Considering the favourable agroecological conditions for the production of vegetables and fruit, the Republic of Srpska should continue to promote production and foreign trade in these traditional products and improve their competitiveness on international markets.

Key words: vegetables, fruit, export competitiveness, Republic of Srpska, foreign trade

Introduction

In the conditions of an open market, one of the key priorities for decision-makers in the field of managing agricultural development is improving the competitiveness of the domestic agro-industrial sector on the international market. Generally, agriculture plays a significant role in the economic development of the Republic of Srpska. Natural resources such as land, water, and a favourable climate foster the development of its agricultural sector, which still has a high share in the generation of gross added value of 7.5% (Republic of Srpska Institute of Statistics, 2023). One of the main characteristics of agriculture in the Republic of Srpska is a small average size of agricultural holdings, which, among others, organize the production of fruit and vegetables.

In the period from 2015 to 2022, vegetable production in the Republic of Srpska was organized on average area of 14,385 ha. In the same period, the average production of vegetables was 281,331 tons. The areas under fruit in the Republic of Srpska amounted to an average of 30,872 ha in the period from 2018 to 2022, while the average fruit production in the same period was 116,338 tons. On average, the share of vegetables in the total value of agricultural production realized in the Republic of Srpska in the period from 2015 to 2022 was 9.14%, while the fruit amounted to 8.88%. (Republic of Srpska Institute of Statistics, 2024).

The budget support allocated to producers of fruit and vegetables, which includes production and income support, as well as investments in fruit growing, storage, and processing capacities, and construction of greenhouses, as a response to climate change resilience, influenced the realization of significant production of these crops in the Republic of Srpska and creation of opportunities for exporting these products to certain market destinations.

The liberalization of trade gradually through negotiations with the WTO as a prerequisite for the conclusion of the regional CEFTA and SAA agreement with the EU, both for all products and for vegetables and fruit, opened up the export possibility to the said market destinations. The fruit and vegetable sectors, compared to other sectors of agro-industrial production in the Republic of Srpska, have a significant share in the structure of exports on the world market, the EU, and the market of CEFTA countries. On average, the participation of vegetables and fruit in the total export of the agricultural industry of the Republic of Srpska to the world market from 2015 to 2022 was 7.17% and 15.14%; 12.04% and 9.43% on the EU market, while 1.63% and 9.65% on the CEFTA market.

Highly intensive fruit production, investments in market infrastructure for the fruit and vegetable sector, as well as increasing investments in vegetable production under controlled conditions, and abiding by certain requirements for export to international markets, have influenced these product groups to have strong export competitiveness like vegetables in the world and EU markets, i.e., fruit in the world

and CEFTA markets. However, on the regional market, the vegetable sector recorded weak export competitiveness, while fruit had poor export competitiveness in the EU market.

In general, when it comes to competitiveness, it can be observed from several levels, namely the national economy and the level of the branch or company (Bojnec and Fertő, 2009). Given that this paper analyzes the export competitiveness of a certain sector of the agro-industry of the Republic of Srpska, i.e., fruit and vegetables, it was viewed from the point of comparative advantages. Branković (2015) states that: "these two concepts are theoretically close and they are not completely identical. The concept of comparative advantage says that the country will express a comparative advantage in the production and export of those branches where prices are lower than prices in the conditions of free trade. The term of competitiveness, on the other hand, is understood more broadly, despite the factors affecting comparative advantages, including the influence of other factors, such as government policy." There is considerable literature on the export competitiveness of agricultural products. Mrdalj et al. (2022) analyzed the export competitiveness of milk and dairy products of the Republic of Srpska on international markets, where results showed market segmentation of these products into three parts: dominated price competitiveness in the world market, price and quality competitiveness in the CEFTA market, and predominantly price non-competitiveness on the EU market. Matkovski et al. (2022) identified comparative advantages of agri-food sectors and considered their tendencies during the EU integration process. The results of this research showed that all Western Balkan countries, except Albania, have comparative advantages in exporting agri-food products, highlighting that Serbia has the highest level of comparative advantages in this sector. Pointing out the comparative advantages of the Republic of Serbia in the trade of agri-food products with Western Balkan countries by applying the Balassa index, Cvetković and Petrović-Randelović (2017) found distinct comparative advantages concerning the countries in the region, except with the Republic of Croatia. Török and Jámbor (2013) investigated the effects of the EU accession on the NMS agri-food trade, especially considering the revealed comparative advantages. The results in this research paper showed the increasing intensity of the NMS agri-food trade after the accession with serious deterioration in the agri-food trade balance in most cases. According to the same authors, all countries experienced a decrease in their comparative advantage after the accession, though it remained at an acceptable level in most cases. Bojnec and Fertő (2016) provided evidence of the fruit and vegetable products export competitiveness of the European Union (EU-27) member states in the global markets by using of the RCA index. In this research, the authors found out "that the most export competitive EU-27 member states showed competitiveness in the global fruit and vegetable product chain markets in each or most stages of the fruit and vegetable sector export supply chain, according to the level of the fruit and vegetable product processing and marketing, while the EU-27 member states with uncompetitive exports are not competitive in all or most stages of the fruit and

vegetable sector export chain, regardless of the level of the fruit and vegetable product processing". Ahmad et al. (2021) explored the export competitiveness of major fruit and vegetables in Pakistan through calculation of various RCA indices for 2001 – 2018. The results indicated that mangoes, citrus, and dates had revealed comparative advantage, while estimated results of various RCA indices for onions and potatoes showed comparative advantages as well as disadvantages.

This work aimed to determine the level of export competitiveness based on the available data on the foreign trade exchange of fruit and vegetables on the world market, the EU, and the CEFTA market. Also, eight vegetables and fruit crops were the subject of research: tomatoes (fresh or chilled), onions, cucumbers, gherkins, apples, pears, peaches, and plums. These crops were selected considering their share in the structure of production and available statistical data on foreign trade. As the most dominant vegetable crop in production, the potato was not under study. According to the statistical database, the Republic of Srpska did not record the export of potatoes in the observed period, and for that reason, it was not possible to define its export competitiveness.

The measurement of vegetable and fruit export competitiveness on the world, EU, and CEFTA markets was based on using two evaluation indices: the TC index and the RCA index.

Material and Methods

The foreign trade analysis and international competitiveness for product groups 07 (vegetables) and 08 (fruit), as well as for eight representative vegetables and fruit products were measured at the world, EU and CEFTA levels. The sample for this research was composed of four vegetable and fruit products: tomatoes, onions, cucumbers, gherkins, apples, pears, peaches, and plums for the sample period from 2015 to 2022. To investigate foreign trade and comparative advantages for product groups 07 and 08, the database of the Republic of Srpska Institute of Statistics was used according to the Harmonized system of classification.

The first step in this research was to analyze foreign trade for product groups of custom tariffs 07 (vegetables) and 08 (fruit) and single products of the Republic of Srpska. The second step was to calculate the trade competitiveness index (TC) and revealed the comparative advantage index (RCA) for product groups 07 and 08 of the Republic of Srpska, as well as for eight representative vegetable and fruit products.

The formula for measuring trade competitiveness (TC) was as follows:

$$TC_{ij} = \frac{(X_{ij} - M_{ij})}{(X_{ij} + M_{ij})}$$

where TC_{ij} refers to the ratio of "export minus imports" of product groups/product j in country i to the total import and export of product groups or single products. X_{ij} represents the export value of j th product groups or single products in the i th country. M_{ij} represents the import value of j th product groups or single products in the i th country (Wei, 2005; Long 2021). The value of the TC index is between -1.000 and 1.000. The results of the calculation of this index in this research can be interpreted as follows: if the Republic of Srpska imported smaller quantities of vegetables and fruit or certain products than it exported, the export competitiveness of vegetables and fruit or certain products was considered stronger. The following table shows the export competitiveness level of products.

Tab. 1 Trade competitiveness (TC) index level of the export competitiveness for vegetable and fruit products

Index range	Export competitiveness level of products
$TC = -1.000$	Imports but does not export competitiveness
$-1.000 < TC \leq -0.500$	Very poor export competitiveness
$-0.500 < TC \leq 0.000$	Poor export competitiveness
$0.000 < TC \leq 0.500$	Strong export competitiveness
$0.500 < TC < 1.000$	Very strong export competitiveness
$TC = 1.000$	Exports but does not import – strongest export competitiveness

Source: Long, 2021.

To measure export competitiveness at the macro level in foreign trade flows, the most commonly used indices in the literature are revealed comparative advantages (RCA) and its modified versions. The RCA index was developed by Balassa (1977). In this research the RCA index is calculated as follows (Nikolić et al., 2010):

$$RCA_{ij} = \frac{(X_{ik}/X_{it})}{(M_{jk}/M_{jt})}$$

where:

RCA_{ij} refers to revealed comparative advantages of product groups or single products j in country i ;

X_{ik} –the value of the country's export of product groups or single product from the specific tariff k to market j ;

X_{it} - the total value of country's export to market j ;

M_{jk} - the value of imports of product groups or single product from the specific tariff k to market j ;

M_{jt} - the total value of imports to market j .

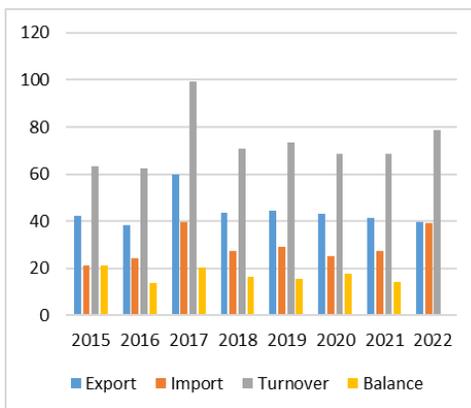
It RCA index values are greater than 1, this indicates the country's comparative advantages revealed on a particular foreign market. In this research the

RCA index enabled insight into the trade position of the Republic Srpska's vegetable and fruit sectors on three destination markets: world, EU, and CEFTA. This index also showed which products within vegetable and fruit sectors achieved a better position on the said destination markets. The third step, based on the values calculated for the TC and RCA indices, used the measures of descriptive analysis.

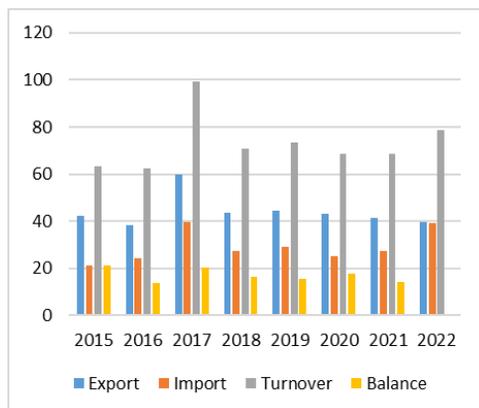
Results and Discussion

Foreign trade in vegetables and fruit

Fruit and vegetables are two sectors in which the Republic of Srpska has comparative advantages on the international market. Observing the foreign trade in vegetables (Custom tariff group 07) at the world level, this sector had a positive balance in the 2015 – 2022 period. The maximum value of vegetables exported amounting to 26.72 million BAM was recorded in 2021, while the maximum value of imports was approximately 20.23 million BAM in the last two years of the observed period. The highest surplus of the vegetable sector on the international market was recorded in 2020 (6.71 million BAM). The highest level of trade in vegetables on the world level was in 2021 (46.95 million BAM). Analysing the trade in fruit (Custom tariff group 08), this sector, like vegetables, recorded a surplus during the observed period, i.e., exports were higher than imports. The maximum value of total foreign trade in the amount of 99.36 million BAM was recorded in 2017, and the minimum value in 2016. The maximum value of fruit exports amounting to 59.84 million BAM was in 2017, while the maximum value of fruit imports (39.52 million BAM) was recorded in the same year. The highest surplus in the fruit trade on the international market was in 2015 (21.05 million BAM) (Graphs 1 and 2.).

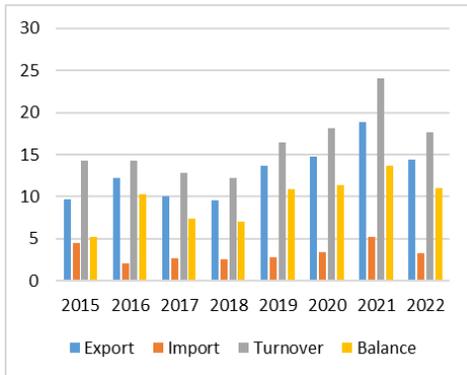


Graph 1 Indicators of foreign trade in vegetables between the Republic of Srpska and the world from 2015 to 2022 (mil. BAM)

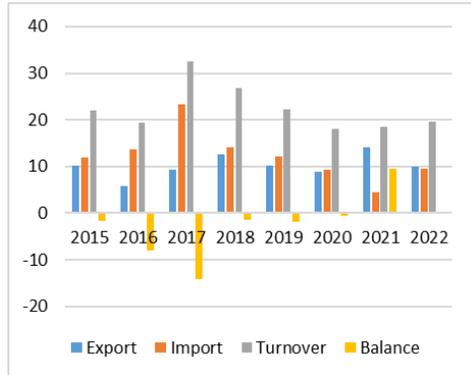


Graph 2 Indicators of foreign trade in fruit between the Republic of Srpska and the world from 2015 to 2022 (mil. BAM)

Regarding the vegetable trade between the Republic of Srpska and the European Union, there were positive financial effects, i.e., during the whole observed period there was a positive trade balance, especially in the 2018 – 2021 period.



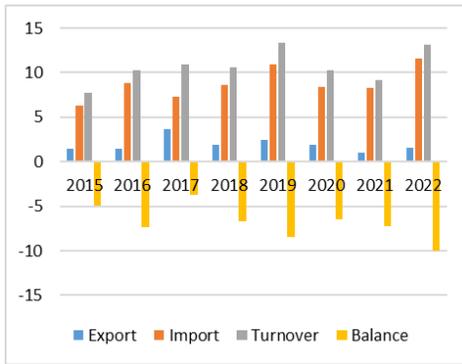
Graph 3 Indicators of foreign trade in vegetables between the Republic of Srpska and the EU from 2015 to 2022 (mil. BAM)



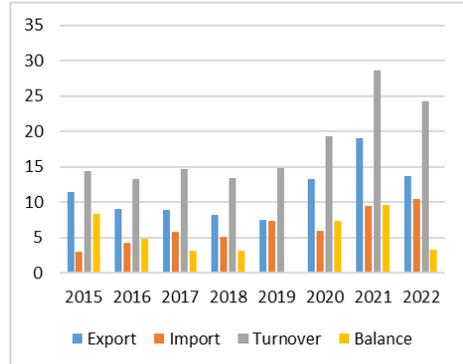
Graph 4 Indicators of foreign trade in fruit between the Republic of Srpska and the EU from 2015 to 2022 (mil. BAM)

The maximum surplus in the total trade of vegetables amounted to 13.68 million BAM in 2021. The maximum value of total trade amounting to 24.06 million BAM was recorded in 2021. The import of vegetables from the EU had been constantly increasing in the 2016 – 2021 period. Unlike vegetables, the Republic of Srpska had a deficit in the fruit trade with the EU in the 2015 - 2020 period. The maximum deficit value in the fruit trade with the EU was recorded in 2017 (-14.09 million BAM). A somewhat more favourable trend, i.e., decrease in the deficit was from 2018 to 2020. For the first time, the Republic Srpska recorded a surplus in the foreign trade of fruit with the EU in 2021. In 2022 the values of export and import were almost identical. The exports had a slightly higher value than imports. The maximum value of total trade in fruit between the Republic of Srpska and the EU was achieved in 2017 (32.62 million BAM).

Vegetable trade between the Republic of Srpska and the CEFTA showed a negative balance. The maximum value of a deficit of 9.97 million BAM was recorded in 2022.



Graph 5 Indicators of foreign trade in vegetables between the Republic of Srpska and the CEFTA from 2015 to 2022 (mil. BAM)



Graph 6 Indicators of foreign trade in fruits between the Republic of Srpska and the CEFTA from 2015 to 2022 (mil. BAM)

The highest amount in the vegetable trade was 13.37 million BAM in 2019, while the maximum value of import was 11.57 million BAM recorded in 2022. Unlike vegetables, fruit recorded a constant surplus on the CEFTA market. In 2019 fruit export and import were almost identical in values. The maximum value of the surplus amount was 9.57 million BAM in 2021 when the Republic of Srpska recorded the maximum trade (28.63 million BAM). The fruit import in the Republic of Srpska tended to increase in the three last years of the observed period, i.e., in 2022 the value of import amounted to 10.5 million BAM. Analyzing the structure of total trade in vegetables, according to country groups (Tab.2), the highest share of 3.29% was recorded compared with the European Union, while 1.94% in the CEFTA countries. The Republic of Srpska exported mostly vegetables on the EU market with a share of 12.04%. The average share of vegetable imports from the EU to the Republic of Srpska's market was 0.87%. In the observed period, the CEFTA was less important for the Republic of Srpska from the point of view of foreign trade in vegetables. An average share of 3.11% was recorded in vegetable trade between the Republic of Srpska and the world. The Republic of Srpska recorded an average share of 7.17% in the export of vegetables on the world market, while the average share of imports was lower and amounted to 1.84%. In the structure of vegetable export on the CEFTA market, the Republic of Srpska recorded an average share of 1.63%, while 2.06% when it comes to import.

Tab. 2 Export, import, and turnover share in the vegetable trade between the Republic of Srpska and the world, EU, CEFTA from 2015 to 2022

World	2015	2016	2017	2018	2019	2020	2021	2022	Average
Export (%)	5.33	5.45	5.39	6.34	8.15	9.39	9.82	7.53	7.17
Import (%)	1.57	1.69	1.35	1.89	2.18	2.13	2.13	1.73	1.84
Turnover (%)	2.46	2.75	2.48	2.97	3.60	3.87	3.85	2.92	3.11
EU									
Export (%)	11.29	12.48	9.20	8.93	13.45	14.24	14.76	11.94	12.04
Import (%)	1.39	0.62	0.77	0.72	0.72	0.90	1.20	0.60	0.87
Turnover (%)	3.48	3.38	2.75	2.61	3.39	3.77	4.30	2.66	3.29
CEFTA									
Export (%)	1.39	1.15	3.13	1.56	2.10	1.79	0.84	1.11	1.63
Import (%)	1.67	2.35	1.92	2.30	3.07	2.46	0.22	2.49	2.06
Turnover (%)	1.61	2.05	2.21	2.11	2.83	2.30	0.24	2.16	1.94

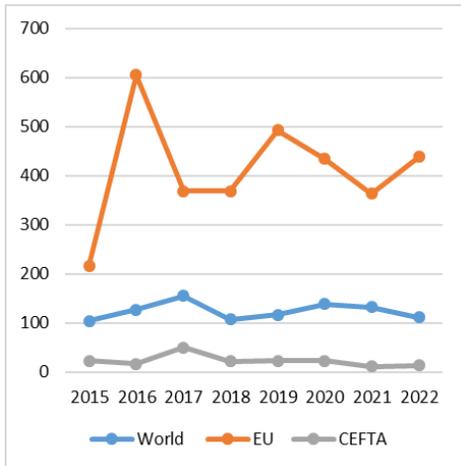
The following table presents the structure of trade in fruit between the Republic of Srpska and the world, as well as the EU and CEFTA. The Republic of Srpska recorded an average share of 15.41% in total exports of fruit and 3.23% in imports.

Tab. 3 Export, import, and turnover share in fruit trade between the Republic of Srpska and the world, EU, CEFTA from 2015 to 2022

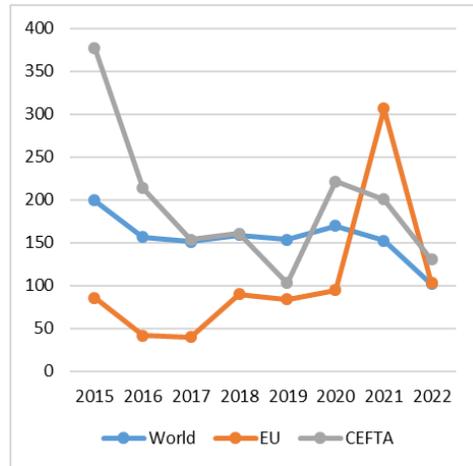
World	2015	2016	2017	2018	2019	2020	2021	2022	Average
Export (%)	17.02	11.89	17.47	15.45	16.45	16.72	15.22	13.11	15.41
Import (%)	2.61	2.98	4.49	3.11	3.34	3.10	2.86	3.32	3.23
Turnover (%)	6.00	5.50	8.12	6.11	6.45	6.36	5.62	5.32	6.18
EU									
Export (%)	11.77	5.80	8.44	11.75	9.96	8.51	10.96	8.24	9.43
Import (%)	3.67	4.20	6.53	3.91	3.15	2.47	1.06	1.77	3.34
Turnover (%)	5.38	4.57	6.98	5.72	4.57	3.77	3.32	2.95	3.29
CEFTA									
Export (%)	10.97	7.14	7.73	6.61	6.42	12.40	16.41	9.51	9.65
Import (%)	0.80	1.12	1.53	1.36	2.06	1.76	0.26	2.26	1.39
Turnover (%)	2.99	2.63	2.98	2.66	3.14	4.31	0.75	3.98	2.93

The Republic of Srpska’s share in fruit export was more significant comparing with the CEFTA (9.65%) than with the EU, while the EU had a more significant share (3.34%) in the structure of imports. The Republic of Srpska had a significant scope of trade with the EU, i.e., an average share of 3.29%. Generally, observing the scope of trade, it was more significant in fruit than in vegetables during the analyzed period. An average share of fruit in the total trade was about 6.18%, while 3.11% for vegetables. Compared with the EU, the Republic of Srpska’s export in vegetables significantly exceeded import in the observed period. The maximum coverage of imports by exports was recorded in 2016, while minimum in 2015. From 2019 –

2021 the coverage of imports by exports decreased. Also, compared with the CEFTA countries, the export of vegetables exceeded the import, i.e., coverage of imports by exports was not greater than with the EU, but with fewer variations and more stable. Considering the coverage of imports by exports in fruit, it was more oscillatory compared with both groups of countries. In the last three years, there was a noticeable decline in the coverage of fruit imports by exports.



Graph 7 Coverage of imports by exports in vegetable trade between the Republic of Srpska and the world, EU, CEFTA from 2015 to 2022



Graph 8. Coverage of imports by exports in fruit trade between the Republic of Srpska and the world, EU, CEFTA from 2015 to 2022

The TC and RCA indices for vegetables and fruit (Custom tariff 07 and 08)

The values calculated for vegetables and fruit TC and RCA indices are presented in the following table. At the world level index TC07 showed strong export competitiveness in vegetables. The TC index for vegetables varied in different years. There were two continuous growth cycles; from 2015 (TC index of - 0.019) to 2017 (TC index 0.216) and from 2018 (TC index 0.036) to 2020 (TC index 0.161). There was a short declining cycle at the end of the observed period (TC index from 0.138 to 0.056). Observing this index at the EU level, a stronger position in export competitiveness of the vegetable sector can be noticed compared with the world level. The highest value of TC07 index of vegetables was in 2016 (0.716), and the lowest in 2015 (0.369). Generally, the TC index of vegetables at the EU level varied during the observed period. The export competitiveness of vegetables in the CEFTA market was significantly deteriorating, especially in the two last years of the observed period (TC index of -0.788 and -0.758). Regarding the RCA07 index at the world level, the Republic of Srpska recorded strong export competitiveness, especially in 2017 (RCA of 2.187). In the last two years, the RCA index declined. At the EU level, the index of revealed comparative advantages for vegetables

indicated very strong export competitiveness in this market, i.e., it was higher than 2.500 except in 2015 (RCA index of 2.417). Compared with the CEFTA market, the export competitiveness of vegetables stayed at a low level during the observed period.

Tab. 4 The TC and RCA index for vegetables and fruit in the Republic of Srpska from 2015 to 2022

World/Year	TC₀₇	TC₀₈	RCA₀₇	RCA₀₈
2015	0.019	0.333	1.737	3.338
2016	0.119	0.221	1.959	2.420
2017	0.216	0.204	2.187	2.134
2018	0.036	0.228	1.499	2.220
2019	0.076	0.211	1.542	2.034
2020	0.161	0.259	1.824	2.238
2021	0.138	0.208	1.664	1.923
2022	0.056	0.008	1.479	1.341
EU/Year	TC₀₇	TC₀₈	RCA₀₇	RCA₀₈
2015	0.369	-0.077	2.417	0.955
2016	0.716	-0.411	6.465	0.446
2017	0.574	-0.432	3.588	0.386
2018	0.574	-0.053	3.599	0.877
2019	0.663	-0.088	5.155	0.877
2020	0.626	-0.027	4.534	0.989
2021	0.569	0.508	3.653	3.076
2022	0.629	0.015	4.716	1.108
CEFTA/Year	TC₀₇	TC₀₈	RCA₀₇	RCA₀₈
2015	-0.629	0.581	0.375	6.219
2016	-0.717	0.363	0.281	3.644
2017	-0.336	0.212	0.725	2.243
2018	-0.633	0.233	0.302	2.159
2019	-0.631	0.015	0.330	1.501
2020	-0.627	0.378	0.361	3.487
2021	-0.788	0.334	0.162	2.733
2022	-0.758	0.277	0.166	0.682

Analyzing the state of fruit competitiveness based on the values of TC and RCA indices, it can be noticed that the Republic of Srpska was more competitive on the CEFTA than the EU market. The TC₀₈ index varied from 0.008 to 0.333 at the world level. Generally, the Republic of Srpska had strong fruit export competitiveness at the world level. Comparing the TC₀₈ index with the TC₀₇ index at the world level, it seems that the Republic of Srpska had better export competitiveness in fruit than in vegetables during the observed period. Considering the fruit sector, the CEFTA was more significant than the EU market for the Republic of Srpska as an export market. The value of the TC₀₈ index at the EU level was from -0.077 (2015) to 0.508 (2021), which implies poor export competitiveness of the

Republic of Srpska in this market. The exceptions were 2020 and 2021, when export competitiveness was strong and very strong, which was a positive shift compared to other years in the analyzed period. Considering the CEFTA market, the Republic of Srpska had very strong export competitiveness in 2015 (TC08=0.581). In other years, this index had a value from 0.015 (2019.) to 0.378 (2020.), i.e., its export competitiveness was strong.

The RCA index shows strong export competitiveness for fruit at the world level, ranging from 1.341 (2020) to 2.420 (2016). In 2015 the value of the RCA index was more than 2.500, i.e., 3.338. On the EU market fruit mostly recorded weak export competitiveness during the analyzed period. The exception was the last two years of the observed period, when export competitiveness was strong (RCA08 = 1.108); (RCA08 =3.076). On the CEFTA market, the export competitiveness of fruit tended to decline from 2015 to 2019. The maximum value of the RCA of 6.219 was recorded in 2015 and the minimum of 0.628 in 2022. Generally, the export competitiveness for fruit was strong during the observed period.

The descriptive statistics of export competitiveness according to the TC and RCA indices of vegetables and fruit for individual markets are presented in the following table. According to TC07, the Republic of Srpska had an average strong export competitiveness at the world level, while at the EU level it was strong and weak in the CEFTA market. In the case of fruit, according to the TC index, export competitiveness on average was strong at the world level, while at the EU level it was weak and strong on the CEFTA market. The situation is identical according to both indices, with the fact that it could be said that the categorization of export competitiveness in the case of vegetables is completely identical in both indices, while in the case of fruit, it ranged from weak to medium at the EU level and from strong to very strong at the CEFTA level.

Tab. 5 Descriptive statistical analysis of the TC and RCA index for vegetables and fruit in the Republic of Srpska from 2015 to 2022

Product groups	Mean	Median	Min.	Max.	SD
TC _{world07}	0.103	0.097	0.019	0.216	0.068
TC _{world08}	0.209	0.216	0.008	0.333	0.092
TC _{EU07}	0.590	0.600	0.369	0.716	0.103
TC _{EU08}	-0.071	-0.065	-0.432	0.508	0.291
TC _{CEFTA07}	-0.640	-0.632	-0.788	-0.336	0.139
TC _{CEFTA08}	0.230	0.284	-0.277	0.581	0.261
RCA _{world07}	1.736	1.701	1.479	2.187	0.247
RCA _{world08}	2.206	2.177	1.341	3.338	0.559
RCA _{EU07}	4.266	4.094	2.417	6.465	1.230
RCA _{EU08}	1.089	0.916	0.386	3.076	0.843
RCA _{CEFTA07}	0.338	0.316	0.162	0.725	0.176
RCA _{CEFTA08}	2.834	2.488	0.682	6.219	1.680

The TC and RCA indices for vegetable and fruit crops

The analysis of observed indices by individual products of vegetables is presented in the following table. The analysis of the TC index by product shows that cucumbers had an average very high export competitiveness ($TC_{\text{cucumber}} = 0.647$), while onions ($TC_{\text{onion}} = -0.948$) and tomato ($TC_{\text{tomato}} = -0.720$) recorded very weak export competitiveness. The export competitiveness of tomatoes declined from 2018 to 2022 and was almost at the level of "*imports but does not export competitiveness*". A similar situation was with the onion. On the other side, cucumbers had a TC value of around 1.000 during the analyzed period, i.e., very strong export competitiveness, with the exception of the initial year when the value of $TC_{\text{cucumber}} = -1.000$. Because the production of gherkins in the Republic of Srpska is in expansion, since 2019 this product has recorded very weak export competitiveness. When it comes to fruit, apples ($TC_{\text{apple}} = 0.579$) and pears ($TC_{\text{pear}} = 0.294$) had on average the highest export competitiveness, followed by plums ($TC_{\text{plum}} = 0.008$) and peaches ($TC_{\text{peach}} = -0.270$). The first two products had on average very strong export competitiveness for the observed period, while it was strong for the plum and weak for the peach. Generally, during the observed period, apples had very strong export competitiveness, except in 2021 when it was strong. The pear consistently had strong competitiveness. Considered the main fruit product in the Republic of Srpska, the plum had a decline in export competitiveness, especially since 2017. In the period from 2018 to 2022, it is noticeable that the Republic of Srpska had weak or very weak export competitiveness in plums, and this was especially evident in the last two years. Observing the RCA index for individual vegetable crops, it is evident that on average tomatoes ($RCA_{\text{tomato}} = 0.376$) had weak export competitiveness, as well as onions ($RCA_{\text{onion}} = 0.004$). Cucumbers ($RCA_{\text{cucumber}} = 21.463$) and gherkins ($RCA_{\text{gherkin}} = 3.543$) had the best position in the world market. In terms of fruit, apples and pears had an average competitiveness index above 2.500, ($RCA_{\text{apple}} = 7.735$) and ($RCA_{\text{pear}} = 2.598$) respectively. Plums on average ($RCA_{\text{plum}} = 2.239$) had strong competitiveness. However, this index also shows a noticeable decline, especially in the last two years of the analyzed period, indicating weak export competitiveness. Although the peach ($RCA_{\text{peach}} = 1.283$) on average had a medium export competitiveness (the table below), its competitiveness was declining and in 2022 ($RCA_{\text{peach}} = 0.000$) there was no export.

Tab. 6 The TC and RCA index for vegetable and fruit crops at the world market from 2015 to 2022

Products	2015	2016	2017	2018	2019	2020	2021	2022
TC tomato, fresh or chilled	-0.874	0.024	-0.240	-0.998	-1.000	-0.950	-1.000	-1.000
TC onion	-0.821	-0.842	-0.939	-1.000	-0.998	-1.000	-0.981	-1.000
TC cucumber	-1.000	0.922	0.898	0.862	0.809	0.924	0.917	0.824
TC gherkin	0.696	0.423	0.764	0.349	-1.000	-0.377	-0.049	-0.936
TC apple	0.504	0.519	0.516	0.569	0.762	0.873	0.090	0.796
TC pear	0.296	0.310	0.234	0.294	0.363	0.359	0.209	0.289
TC peach	-0.817	0.111	0.027	0.542	-0.192	-0.331	-0.502	-1.000
TC plum	0.675	0.241	0.274	-0.153	-0.227	-0.0085	-0.235	-0.429
RCA tomato, fresh or chilled	0.112	1.619	0.864	0.002	0.000	0.034	0.000	0.000
RCA onion	0.165	0.132	0.044	0.000	0.001	0.000	0.012	0.000
RCA cucumber	0.019	37.894	26.140	18.874	12.535	33.278	29.265	13.699
RCA gherkin	9.334	3.802	10.526	2.895	0.002	0.596	1.143	0.043
RCA apple	5.067	4.876	4.410	5.087	9.814	19.511	1.510	11.605
RCA pear	3.075	2.931	2.269	2.557	2.835	2.796	1.926	2.394
RCA peach	0.169	1.928	1.489	4.701	0.897	0.663	0.417	0.000
RCA plum	8.630	2.523	2.475	1.026	0.835	1.112	0.781	0.528

Tab. 7 Descriptive statistical analysis of the TC and RCA index for vegetable and fruit crops at the world market from 2015 to 2022

Products	Mean	Median	Min.	Max.	SD
TC tomato, fresh or chilled	-0.720	-0.950	-1.000	0.024	0.427
TC onion	-0.948	-0.989	-1.000	-0.821	0.075
TC cucumber	0.647	0.880	-0.978	0.924	0.658
TC gherkin	-0.016	0.150	-0.997	0.764	0.695
TC apple	0.579	0.544	0.090	0.873	0.245
TC pear	0.294	0.295	0.209	0.363	0.054
TC peach	-0.270	-0.261	-1.000	0.542	0.505
TC plum	0.008	-0.119	-0.429	0.675	0.361
RCA tomato, fresh or chilled	0.376	0.034	0.000	1.619	0.631
RCA onion	0.044	0.007	0.000	0.165	0.067
RCA cucumber	21.463	22.507	0.019	37.894	12.529
RCA gherkin	3.543	2.019	0.002	10.526	4.175
RCA apple	7.735	5.077	1.510	19.511	5.733
RCA pear	2.598	2.677	1.926	3.075	0.385
RCA peach	1.283	0.780	0.000	4.701	1.527
RCA plum	2.239	1.069	0.528	8.630	2.692

Out of the vegetable crops under study, only cucumbers were exported to the EU market in the observed period. Its competitiveness according to the TC and RCA index was on average very strong ($TC_{\text{cucumber}} = 0.740$); ($RCA_{\text{cucumber}} = 189.485$). Observing the data, it can be seen that in the last three years there was a decline in calculated values for both indices, but they were still high. All four fruit products were exported to the EU market. On average, apples had very weak export

competitiveness on the EU market ($TC_{\text{apple}} = -0.389$) and during the analyzed period their competitiveness declined. The exception was the year 2021 when the value of the TC was positive (0.352) indicating strong export competitiveness. According to the RCA index, the competitiveness of apples on average was weak ($RCA_{\text{apple}} = 0.639$). In 2020 and 2021 apples had medium export competitiveness. Pears had weak export competitiveness on the EU market. According to the TC index, the average TC value for pears was -0.822, and the RCA index was 0.109. The plum was the most competitive fruit product on the EU market with a projected TC value = 0.778, as well as $RCA = 143.426$. Weak export competitiveness of plums was $TC = 0.408$ in 2017 and strong in 2015, $TC = 0.997$. Peaches had low export competitiveness on the EU market. Thus, cucumbers and plums were two products that both had a high-value index that ranged from $0.500 < TC < 1.000$ and $RCA = 2.500$, thus indicating very strong competitiveness on this market.

Tab. 8 The TC and RCA index for vegetable and fruit crops on the EU market from 2015 to 2022

Products	2015	2016	2017	2018	2019	2020	2021	2022
TC cucumber	-1.000	0.981	0.993	0.981	0.990	0.995	0.993	0.986
TC apple	-0.851	-0.855	-0.940	-0.075	-0.342	-0.048	0.352	-0.352
TC pear	-0.918	-0.853	-0.980	-0.925	-0.836	-0.833	-0.483	-0.751
TC peach	-0.524	-1.000	-0.939	-0.728	-0.317	-1.000	-1.000	-1.000
TC plum	0.997	0.679	0.408	0.804	0.541	0.826	0.994	0.973
RCA cucumber	0.000	112.765	279.474	103.637	206.687	389.593	276.338	147.384
RCA apple	0.090	0.084	0.030	0.838	0.513	0.948	2.094	0.515
RCA pear	0.047	0.085	0.010	0.038	0.093	0.095	0.350	0.153
RCA peach	0.348	0.000	0.030	0.153	0.542	0.000	0.000	0.000
RCA plum	688.709	5.590	2.315	8.968	3.509	10.965	348.487	78.863

Table 9. Descriptive statistical analysis of the TC and RCA index for vegetable and fruit crops on the EU market from 2015 to 2022

Products	Mean	Median	Min.	Max.	SD
TC cucumber	0.740	0.988	-1.000	0.995	0.703
TC apple	-0.389	-0.347	-0.940	0.352	0.463
TC pear	-0.822	-0.45	-0.980	-0.483	0.154
TC peach	-0.814	-0.970	-1.000	-0.317	0.265
TC plum	0.778	0.815	0.408	0.997	0.220
RCA cucumber	189.485	177.036	0.000	389.593	123.585
RCA apple	0.639	0.514	0.030	2.094	0.683
RCA pear	0.109	0.089	0.010	0.350	0.107
RCA peach	0.134	0.015	0.000	0.542	0.205
RCA plum	143.426	9.966	2.315	688.709	250.047

The Republic of Srpska did not export any of the analyzed vegetable products to the market of the CEFTA countries, i.e., it did not have export competitiveness. In terms of fruit, exports were mainly realized through three crops: apples, pears, and plums. According to the observed indices, apples had very strong export competitiveness on the CEFTA market. On average the values of the TC and RCA indices of apples were 0.517 and 6.856. According to the TC indicator, apple competitiveness was weak in 2021 (-0.130) and strong in 2015 (0.762). In terms of the RCA index, the maximum export competitiveness of apples was in 2015 (12.170) and the minimum in 2021 (1.049). In addition to apples, pears had strong or very strong export competitiveness, with average values of TC = 0.464 and RCA = 5.113. Weak competitiveness of pears, according to the TC index, was recorded in 2021 (-1,000), i.e., “*imports but does not export competitiveness*”, and according to the RCA index in 2016 and 2017. Pears had strong export competitiveness in 2016 and 2017 (1.000), while in terms of the RCA index in 2018 (23.765). The plum had very weak average export competitiveness on the CEFTA market according to both indices (TC_{plum} = -0.928) and (RCA_{plum} = 0.066). In 2021, the level of import but not export competitiveness was achieved (TC_{plum} = -1,000). The maximum export competitiveness in this market for plums in terms of the TC index was in 2015 (TC_{plum} = -0.647) and can be characterized as very low. Regarding the RCA index, the best competitiveness on the CEFTA market for plums was achieved in 2015 (RCA_{plum} = 0.353). The plum had weak competitiveness on the CEFTA market in 2021 according to both indices.

Tab. 10 The TC and RCA index for vegetable and fruit crops on the CEFTA market from 2015 to 2022

Products	2015	2016	2017	2018	2019	2020	2021	2022
TC _{apple}	0.762	0.737	0.340	0.626	0.573	0.712	-0.130	0.523
TC _{pear}	0.347	1.000	1.000	0.893	0.495	0.283	-1.000	0.692
TC _{plum}	-0.647	-0.904	-0.980	-0.941	-0.981	-0.976	-1.000	-0.996
RCA _{apple}	12.170	11.250	2.957	5.853	5.367	9.344	1.049	3.846
RCA _{pear}	3.402	0.000	0.000	23.765	4.313	2.816	0.000	6.609
RCA _{plum}	0.353	0.086	0.015	0.041	0.014	0.019	0.000	0.002

Tab. 11 Descriptive statistical analysis of the TC and RCA index for vegetable and fruit crops on the CEFTA market from 2015 to 2022

Products	Mean	Median	Min.	Max.	SD
TC _{apple}	0.517	0.626	-0.130	0.762	0.319
TC _{pear}	0.464	0.593	-1.000	1.000	0.655
TC _{plum}	-0.928	-0.978	-1.000	-0.647	0.118
RCA _{apple}	6.856	5.853	1.049	12.170	4.201
RCA _{pear}	5.113	3.109	0.000	23.765	7.905
RCA _{plum}	0.066	0.017	0.000	0.353	0.119

Conclusion

The analysis of the foreign trade of the Republic of Srpska in vegetables and fruit showed a positive balance compared to the world from 2015 to 2022. Fruit mostly recorded a deficit on the EU market, except for the two last years of the observed period when this produce showed a surplus in foreign trade. Vegetables constantly recorded a surplus on the EU market. On the CEFTA market vegetables constantly recorded a deficit, while a surplus in fruit, although imports increased in the last three years of the observed period. In the structure of export, the average share of vegetables was 7.1% on the world level, while 12.04% and 1.63% at the EU and CEFTA levels. The average share of fruit export was 15.41% at the world level, while 9.43% and 9.65% at the EU and CEFTA levels. The vegetable share in total foreign trade of the Republic of Srpska was 3.11% and fruit 6.18%. The positive coverage of imports by exports in vegetables in the Republic of Srpska was recorded at the world, EU, and CEFTA levels. There was also positive coverage of imports by exports in fruit except for the last three years of analysis. According to both indices, the Republic of Srpska on average recorded strong export competitiveness in vegetables at the world level, while very strong export competitiveness at the EU level. The position in the foreign trade of vegetables on the CEFTA market was very weak. The average values of the fruit TC and RCA index of indicated strong export competitiveness at the world level, while weak to medium at the EU level was fro. The export competitiveness of fruit was strong to very strong on the CEFTA market. Hence, for fruit the EU is a less important market, while the CEFTA is a less important market for vegetables in terms of export competitiveness. Fruit is more competitive on the world market compared to vegetables. Analyzing vegetable and fruit crops, cucumbers had very strong competitiveness, as well as gherkins, although since 2018 its competitiveness had been decreasing. The onion had very weak competitiveness, followed by the tomato. On the international market apples and pears had very strong competitiveness. The plum had strong competitiveness, although its competitiveness had been falling since 2017. Finally, the peach was characterized with very weak competitiveness on the world market. On the EU market, cucumbers had on average very strong competitiveness with a tendency of decreasing in the last three years of the observed period. Apples, pears, and peaches had weak export competitiveness, while the plum was the most competitive fruit crop on the EU market. None of the observed vegetable crops had a pronounced competitive advantage on the CEFTA market. Apples and pears had the most distinctive comparative advantage on the CEFTA market, while plums recorded weak export competitiveness. Based on all above mentioned, there are three dominant products with strong export competitiveness: cucumbers and plums on the EU market and apples on the CEFTA market. On the EU market most crops lacked competitiveness as a result of low productivity, and for this reason labour intensive

crops such as cucumbers and plums achieved positive effects on this demanding market. Generally, long-term goals of Republic of Srpska should be to provide significant financial support to the production of vegetables and fruit, as well to improve trade structure in terms of export of high, value-added, processed products based on domestic raw materials, i.e., vegetables and fruit. This would lead to a better position of these product groups on international markets, especially on those where the Republic of Srpska is currently recording weak export competitiveness.

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Анализа извозне конкурентности поврћа и воћа Републике Српске

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Сажетак

Циљ овог истраживања је анализа извозне конкурентности поврћа и воћа Републике Српске на међународном тржишту. Два главна индекса за евалуацију су кориштена: индекс трговинске конкурентности (ТС) и индекс откривене компаративне предности (RCA), за мјерење и анализу међународног положаја поврћа и воћа у периоду 2015. – 2022. Оба показатеља израчуната су на основу статистичких података о вањској трговини поврћем и воћем између Републике Српске и свијета, земља ЕУ и СЕФТА-е, и анализирани кориштењем дескриптивне статистике. У укупном извозу пољопривредно-прехранбеног сектора Републике Српске поврће и воће учествуја са 7,17% и 15,41%. Анализа структуре извоза пољопривредно-прехранбеног сектора Републике Српске показала је просјечно учешће поврћа и воћа од 12,04% и 9,43% на тржишту ЕУ, односно 1,63% и 9,65% на тржишту СЕФТА-е. Резултати указују на јаку извозну конкурентност Републике Српске у поврћу када је ријеч о свјетском и ЕУ тржишту, али слабу извозну конкурентност за земље СЕФТА. Република Српска биљежи јаку извозну конкурентност воћа на свјетском и СЕФТА тржишту, док на тржишту ЕУ лошу извозну конкурентност. Унутар ове двије групе производа, на свјетском тржишту јаку извозну конкурентност имају краставац, јабука, крушка и шљива. На тржишту ЕУ краставац и шљива два су водећа производа по јакој извозној конкурентности, док су јабука и крушка на тржишту СЕФТА. С обзиром на повољне агроеколошке услове за производњу поврћа и воћа, Република Српска треба и даље подстицати производњу и вањску трговину у овим традиционалним производима и унапређивати њихову конкурентност на међународним тржиштима.

Кључне ријечи: поврће, воће, извозна конкурентност, Република Српска, спољна трговина

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