

Analysis and Forecast of Foreign Trade Indicators of Corn in Bosnia and Herzegovina

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Abstract

The aim of this paper is to present the application of quantitative methods in the analysis of foreign trade indicators of corn in Bosnia and Herzegovina. Subsequently, based on the analysis, the forecast of import and export parameters was created for the 2018-20 period which predicted that corn imports and exports would increase both in the natural and value form. Furthermore, it was established for the observed period that Serbia was the largest importer of this crop to Bosnia and Herzegovina, and that Turkey was a country to which the corn from Bosnia and Herzegovina was mostly exported. The research in this paper can serve the purpose of further planning and development of both the production and the markets of this crop and agriculture as a whole.

Key words: analysis, prediction, corn, import, export

Introduction

Commercial significance of corn is great. First of all, this significance is reflected in its diversity of use, both in human nutrition and in domestic animal nutrition, as well as for industrial processing. Corn (*Zea mays* L.) is one of the plants with high biological potential fertility, and almost the entire aboveground plant may be utilized.

Different technological processes make it possible for corn plants to produce more than 1500 different industrial products (Glamočlija, 2012). Also, the utilization of corn production has been gaining ground in recent years. (Ragauskas et al., 2006; Farrell et al., 2006). Ortiz et al (2010) consider that in the underdeveloped countries corn is primarily intended for human consumption, where a growth rate of 1.3% by 2020 is predicted. On the basis of global forecasts, Rosengrant et al. (2008) consider that corn will become the crop with the largest production by 2025 and the need for it will double in the developing countries by 2050.

Foreign trade of corn as a stock exchange goods is becoming more and more important and obtaining the highest price is a priority for all manufacturers. In support of this and based on the research and observation of monthly crop price fluctuations, Mutavdžić et al. (2017), among other things, concluded from the economic aspect when the optimal selling time was, either domestic or foreign (export).

Materials and Methods

Standard statistical and mathematical methods were applied in this paper. Data sources include the statistical databases of the International Trade Centre (ITC) as well as the databases of the Agency for Statistics of Bosnia and Herzegovina. The observed time series of data covers the period of twelve years (2006-2017). The most important features of corn import and export were processed by quantitative methods of descriptive statistics (mean value, variation coefficient, variation interval-minimum and maximum, and the rate of change) and presented in tables and graphs.

The movement intensity of change was quantified by calculating the rate of change from the absolute values of the observed time series based on which the quantitative prediction of parameters in the next three-year period (2018-2020) was made as well.

Results and Discussion

Besides wheat and rice, corn is the most important crop in the world's agricultural production. During the 2017/18 season it amounted to 93,770,518,413.6 tons, while the corn fields occupy little more than 18,352,000,000 hectares (<https://www.usda.gov/>, *Foreign Agricultural Service / USDA, 2018*). The world's corn import amounted to 152,315,834 tons in 2017 and export to 160,957,588 tons, or 5.35% more than the realized import.

However, looking at the value, corn imports amounted to USD 32,767,170,000 in 2017, which is 8.75% more than the export of this crop in the world (www.intracen.org, *International Trade Centre*).

In Bosnia and Herzegovina corn is the most abundant crop. The average surface area it occupied in the observed period was 192.241 ha, which is by 67% more than wheat, the next most common crop in Bosnia and Herzegovina. Also, corn production of 835323.8 tons for the same analysed period predictably dominates the production of other crops in Bosnia and Herzegovina (Table 1).

Tab. 1. Average area, production and yield of major crops in Bosnia and Herzegovina (2006-2017)

Просјечна површина, производња и принос значајних житарица у Босни и Херцеговини (2006-2017)

Crop	Average area (ha)	Average production (t)	Average yield (t/ha)
Corn	192.241,25	835.323,83	4,35
Wheat	65.100,83	234.175,58	3,58
Rye	3.605,17	10.604,92	2,94
Barley	21.133,67	66.310,00	3,12
Oats	11.583,92	29.712,92	2,58

Source: The author's calculation based on data obtained from the Agency for Statistics of BiH

Given the significance and distribution of corn, the author further analysed non-commercial characteristics of this variety in Bosnia and Herzegovina. The following Table 2 shows the dynamics of corn imports and exports during the twelve-year period, where it is noticeable that all three indicators of corn imports in Bosnia and Herzegovina had a tendency of growth. The average amount of corn imports in the observed period was about 207,400 tons with relatively high variability, and the maximum achieved in 2016 (Graph 1). The average value of corn imports for the observed period was \$ 48,154,083.3 and the maximum was reached in 2014 (Graph 2). The price of corn imports ranged from \$ 146 per ton to \$ 334 per ton (Graph 3). Its average value was \$ 240.42 per ton with relatively high mobility instability for the analysed period (Table 2).

As far as corn exports are concerned, Table 2 shows a very large instability in the movement of its indicators for the observed period of twelve years measured by variation coefficients. Exceptionally high instability is expressed in export volumes and realized value of corn exports, with large growth tendencies observed at average annual rates of 53.7% and 30.48%, respectively.

The maximum exported quantity of corn from Bosnia and Herzegovina was recorded in 2014 (Graph 1). Also in 2014, the highest export value of \$ 15,589,000 was recorded (Graph 2).



Graph 1. Analysis of imports and exports of corn in BiH (2006-2017) in tons
Анализа увоза и извоза кукуруза БиХ (2006-2017) тоне
 Source: International Trade Centre, www.intracen.org



Graph 2. Prediction of imports and exports of corn in BiH (2006-2017) in \$
Анализа увоза и извоза кукуруза БиХ (2006-2017) у доларима
 Source: International Trade Centre, www.intracen.org

As far as corn export prices are concerned, it has shown a tendency to fall at a rate of 15.16% and its average value was \$ 792.3 per ton, which is several times higher than the realized import price over the same period (Table 2).

Tab. 2. Dynamics of movement of import and export of corn from Bosnia and Herzegovina (2006-2017)

Динамика кретања увоза и извоза кукуруза из Босне и Херцеговине (2006-2017)

Import					
Indicators	Average value	Interval of variation		Coefficient of variation (%)	Rate of change
		Minimum	Maximum		
Quantity (t)	207.393,00	133.452,00	303.078,00	23,27	0,35
Value (\$)	48.154.083,33	32.643.000,00	59.555.000,00	18,05	3,49
Price (\$/t)	240,42	146,00	334,00	22,32	3,13
Export					
Indicators	Average value	Interval of variation		Coefficient of variation (%)	Rate of change (%)
		Minimum	Maximum		
Quantity (t)	18.148,67	247,00	53.645,00	110,60	53,79
Value (\$)	5.459.416,67	401.000,00	15.589.000,00	93,26	30,48
Price (\$/t)	792,33	240,00	1.624,00	68,79	-15,16

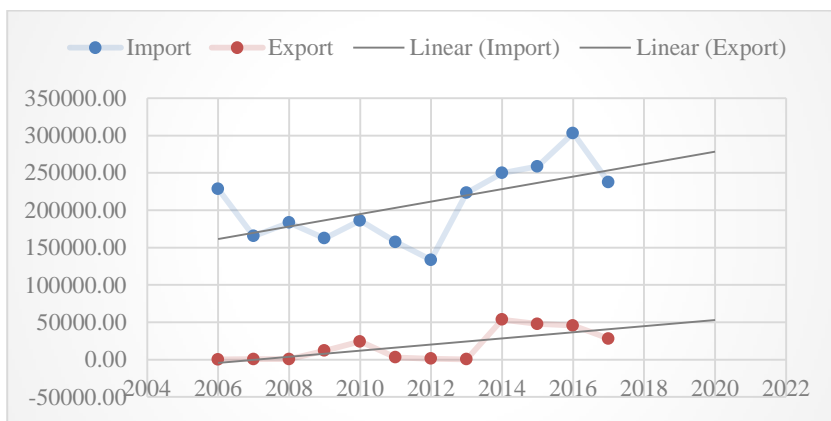
Source: The author's calculation based on the data of the International Trade Centre www.intracen.org

The maximum corn export price was reached in 2007 and amounted to \$ 1,624 per ton (Graph 3).



Graph 3. Prediction of imports and exports of corn in BiH (2006-2017) \$/t
Анализа увоза и извоза кукуруза Босне и Херцеговине (2006-2017) \$/t
 Source: International Trade Centre, www.intracen.org

In the forthcoming period an increase in exported but also in imported corn quantities in Bosnia and Herzegovina is expected (Graph 4).

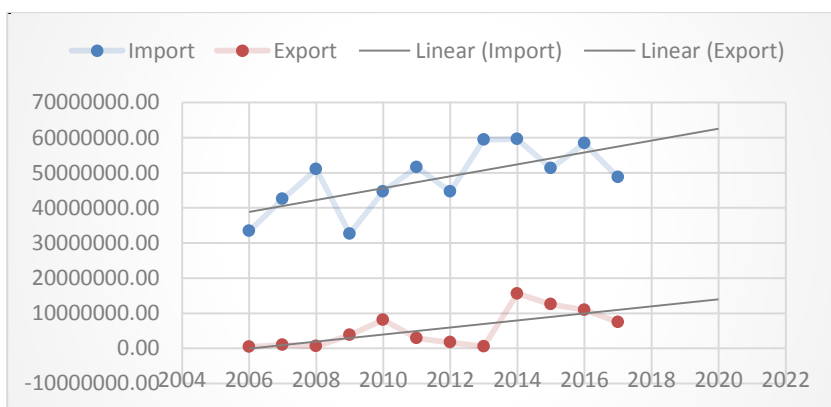


Graph 4. Prediction of imports and exports of corn in BiH (2018-2020) in tons

Предвиђање увоза и извоза кукуруза у БиХ (2018-2020) тоне

Source: The author's calculation based on the data of the International Trade Centre

Naturally, the quantities of imported corn will still be larger than the exported quantities, which is certainly the consequence of natural economic conditions available for the production of this crop. When looking at the value, corn exports will increase in the three-year forecast period, which will certainly be positive for the development of markets and new directions in the country's trade, but not to a great extent, as in the same period there will be an increase of corn imports into Bosnia and Herzegovina. It will to affect the state balance of payments a large extent (Graph 5).



Graph 5. Prediction of imports and exports of corn in BiH (2018-2020) \$

Предвиђање увоза и извоза кукуруза у БиХ (2018-2020) \$

Source: The author's calculation based on the data of the International Trade Centre

Considering the two following graphics, there is obvious permanent decrease in corn export over the last five years of the observed period in terms of quantity and value. This will certainly be reflected in the growth of export trend for this cereal in the future.

The following Table 3 shows the average, minimum and maximum quantities of corn imports and exports in some countries, from which we can see that Serbia is the country with the highest corn export to Bosnia and Herzegovina, namely 175347.7 tons on average for the observed period. Corn imports from the EU amounted to 30,837 tons, accounting for only 17.5% of imports from Serbia in the same period. Also, the Republic of Serbia is the country from which the maximum corn imports into Bosnia and Herzegovina were recorded (283,542 tons) for the observed period of twelve years.

Tab. 3. Import and export of corn from Bosnia and Herzegovina to certain countries (2006-2017)

Увоз и извоз кукуруза из Босне и Херцеговине у поједине земље (2006-2017)

Import			
Country	Average value (t)	Variation interval	
		Minimum	Maximum
Serbia	175.347,75	85.303,00	283.542,00
Croatia	18.979,75	4.318,00	53.174,00
Hungary	11.615,58	393,00	48.965,00
Argentina	793,17	5,00	4.558,00
Turkey	84,08	0,00	668,00
Romania	83,25	0,00	206,00
France	67,58	12,00	136,00
Italy	22,00	0,00	118,00
Austria	18,50	0,00	49,00
EU-28	30.837,08	7427,00	92.718,00
Export			
Country	Average value (t)	Variation interval	
		Minimum	Maximum
Turkey	17.229,33	2,00	52.627,00
Serbia	424,50	210,00	676,00
Slovenia	204,33	0,00	1.045,00
Croatia	200,67	30,00	675,00
Italy	78,83	0,00	897,00
Montenegro	2,42	0,00	15,00
EU-28	486,42	35,00	1458,00

Source: The author's calculation based on the data of the International Trade Centre, www.intracen.org

When it comes to corn exports, the situation is slightly different. Namely, the main destination for the export of corn from Bosnia and Herzegovina is Turkey, where it exported an average of 17,229.3 tons. So far, the maximum exported corn quantity to this country was 52,627 tons, which is also the maximum exported quantity of corn from all parts of the country in the observed period. The EU is the second country for the export of corn from Bosnia and Herzegovina and the percentage of average exported volume compared to Turkey makes only some 2.8% in the observed period. Certainly, the reason for this should be sought in the maximum quantities of corn exported to Turkey in 2014, but also the exported corn quantities to the observed countries which were not more than 1045 tons (Table 3).

Conclusions

The research in this paper has shown the following:

- In the period 2006-17 corn was cultivated in Bosnia and Herzegovina on the average area of 192,241.25 hectares, with an average production of 835,323.83 tons and a yield of 4.35 tons per hectare which was far more than the production indicators of other crops in the same period.
- The average corn imports had a slight tendency of grow both quantitatively and according to its value. In the same period, there was a rising trend of import prices. The average value of corn imports to Bosnia and Herzegovina amounted to 207,393.00 tons with the value of 48,154,083.33 dollars. The average import price recorded during this period was \$ 240.42 per ton.
- The coverage of import measured in tons was only 8.75%, while its value was slightly higher, i.e. 11.3%. The quantitative and value-added corn export from Bosnia and Herzegovina followed the import trend, while the prices showed a tendency to decline. The value of exported corn was \$ 5,459,416.67 and the exported quantity was at the level of 18,148.67 tons. The average export price in the observed twelve-year period was 792.33, which is several times higher than the import price.
- The growth trend of corn import prices as well as the tendency of falling export prices signal that corn should not only be used as a raw material in foreign trade, but also as a crop that would produce higher trade value at higher processing stages and thus have an impact on improving the balance of payments in this branch of the economy.

- In the next three years, natural and value increase in imports and corn exports from Bosnia and Herzegovina is expected.

- Serbia is the country from which the most corn was exported to Bosnia and Herzegovina, averaging 175,347.75 tons, while Turkey was the destination with the highest exports of corn from Bosnia and Herzegovina, where the average export was 17,229.33 tons, as well as the maximum in exported quantities of 52,627.00 tons.

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Анализа и предвиђање спољнотрговинских показатеља кукуруза у Босни и Херцеговини

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Сажетак

У раду су примјеном квантитативних метода као предмет истраживања анализирани спољнотрговински показатељи кукуруза у Босни и Херцеговини. Након тога на основу анализе спроведено је предвиђање увозних и извозних параметара у периоду 2018-2020 година, гдје је том приликом утврђено да ће се увоз и извоз кукуруза повећати како у натуралном тако и вриједоносном облику. Такође, анализом је утврђено да је за посматрани период највећи увозник ове житарице у Босну и Херцеговину била Србија, а да је Турска земља у коју се кукуруз из Босне и Херцеговине највише извозио. Истраживање у овом раду може да послужи у сврху даљег планирања и развоја како производње тако и тржишта ове житарице и пољопривреде у цјелини.

Кључне ријечи: анализа, предвиђање, кукуруз, увоз, извоз

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