RESEARCHING TRENDS AND FORECASTING FUTURE VALUES OF FRUIT EXPORTS AND IMPORTS OF THE REPUBLIC OF SERBIA

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ABSTRACT

Considering that the Republic of Serbia has a surplus in the foreign trade of fruits, the problem of this research refers to the perception of the importance of the foreign trade of fruit of the Republic of Serbia. The subject of the research includes the analysis of previous and future trends in the value of exports and imports of fruits, as one of the most important agro-industrial products. The aim of the research is to determine future trends, as well as to forecast future values of fruit imports and exports using econometric methodology in the field of analysis of variations of time series, i.e. statistical methods of linear trend. The contribution of this research study is multiple, in scientific terms it enriches the existing scientific literature, given that research studies that have addressed this issue are very rare, while in practical terms it provides guidance to producers and exporters of fruits and agricultural policy makers, especially in terms of encouraging fruit exports from the Republic of Serbia in the coming period.

Introduction

Promoting the concept of free trade, and emphasizing the importance of foreign trade, are present even in the early theories of international trade such as Adam Smith's theory of absolute advantage. He pointed out that a country that can produce a certain product at lower costs and higher productivity compared to other countries, has absolute advantages in production, and that such products which are the result of

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production specialization should be exported by the country. On the other hand, it is desirable to import products that could be produced in a certain country at a higher cost and lower productivity compared to other countries. Sawadogo (2019) emphasizes that differences among countries lead to the establishment of trade relations and the realization of international trade, which is mutually beneficial. At the same time, he especially emphasizes the importance of the concept of comparative advantages.

By researching the indicators of foreign trade of a country, very useful information on the state of the national economy can be obtained(Ivanova & Ristić, 2020). There is a strong connection between foreign trade and the growth of the value of gross domestic product(Jokić, 2020; Čavić & Mandarić, 2021), so the higher rates of economic growth can be achieved by those countries whose export sector is successful and competitive and which have a developed national market but also access to other markets (Balassa, 1978). In that context, Kovačević and Sabolović (2002) point out that international exchange is a consequence of the state of the national economy, trends in production and consumption, that is, supply and demand, surpluses and shortages of goods in an economic environment open to the world market.

In the past period, significant oscillations of foreign trade trends have been recorded in the Republic of Serbia, as well as a constant negative value of the foreign trade balance(Vukolić, 2020). Despite the liberalization of trade, the advantages arising from the implementation of the free trade agreements and the inclusion of the Republic of Serbia in the integration process, the value of imports is still above export values(Đurić et al., 2020). The mentioned trends are the result of low competitiveness of Serbian products on the international market (Avakumović et al., 2021), as well as the high share of primary products and products of the early stages of processing in the structure of exports.

The Republic of Serbia has developed the most intensive foreign trade relations with the countries with which it has signed free trade agreements: EU member states, signatories to the Central European Free Trade Agreement (CEFTA) and members of the European Free Trade Association (EFTA), Russia, Kazakhstan, Belarus and Turkey and the United States (Generalized System of Preferences). After the signing of the free trade agreement between Serbia and Kazakhstan, foreign trade became much more intense, but was still below its potential, with the dominance of agricultural and food exports over imports (Simić and Stankov, 2020).

The share of EU member states in the total foreign trade of our country exceeds 60%, and it is considered the most important trade partner of the Republic of Serbia. Blahović, Ilin and Umićević (2002) point out that the European Union accounted for three quarters of the total export of fruits and vegetables from our country, while Kuzman and Stegić (2015) confirm that the European Union is also the leading trade partner of the Republic of Serbia in trade in agro-industrial products. Božić and Nikolić (2016) have come to the same conclusion and state that the largest part of the value (about 50%) of agricultural exports of the Republic of Serbia is directed to the markets

of EU member states, and that member states of the European Union also have the biggest share (about 60%) in the structure of Serbian imports of agri-food products.

Fruit production is one of the most important, and certainly the most productive agricultural branches in the Republic of Serbia. Fruit growing is often considered to be the most profitable branch of the economy(Avakumović et al., 2021). Demand for fruit and fruit products shows high income elasticity, i.e. due to the growth of consumer income, there is an increase in demand for fruit, especially among middle and high income groups, both in developing and developed countries(Vukosavljević et al., 2021).

In the continuation of the paper, the authors will pay special attention to the analysis of fruit production in the Republic of Serbia, as well as the trends and specifics of foreign trade in fruit. After defining the research problem, subject, aims and hypotheses, attention will be directed on reviewing the available scientific literature and considering studies that have studied the same or similar topics. In the second part of the paper, the authors explain the applied methodology (descriptive statistical analysis and analysis of time series variations, i.e. the method of linear trend), present the obtained research results and come to relevant conclusions with emphasis on scientific and professional contribution of this study.

Materials and methods

Challenges and opportunities for fruit production and foreign trade in the Republic of Serbia

In the Republic of Serbia, there are excellent opportunities for the growth of almost all types of fruit, which is mainly due to favorable climatic conditions and soil quality, although some types of fruit can be grown on soils of more modest physical and chemical properties. Vlahović (2010) points out that a large number of fruit species are grown in the Republic of Serbia, such as apple, pear, raspberry, plum, quince, cherry, sour cherry, peach, apricot, strawberry, walnut, etc. Blagojević (2019) points out that five types of fruit (apples, plums, grapes, raspberries, sour cherries) make up about 82% of the total fruit production.

Keserović (2005) also points out to the importance of this branch of agricultural production, emphasizing that fruit growing is one of the most productive branches of agriculture, which exceeds the profitability of other branches. This is supported by Milić and Radojević (2003) who state that fruit growing, as an important area of plant production, has a number of comparative advantages over other branches of agriculture. Fruit production can reach 10 to 20 times higher value per hectare, compared to the production of important field crops, such as wheat and corn. According to the data of the Statistical Office of the Republic of Serbia in 2017, as many as 183,602 hectares of land were under orchards, of which 175,863 hectares were fertile (72,116 ha of plums, 26,360 ha of raspberries, 25,360 ha of apples, 25,281 ha of sour cherries, and 18,956 ha of other fruits).

The share of fruit in the structure of exports of agro-industrial products from the Republic of Serbia is dominant. The overall foreign trade balance of the Republic of Serbia is constantly recording a deficit, while in recent years there has been a surplus in the foreign trade of fruits. According to Vlahović (2004), the placement of fruit from the Republic of Serbia on other markets is limited not by the quality of products, but by non-compliance with strict procedures of picking, freezing, packaging, loading and transport. According to the data of the Statistical Office of the Republic of Serbia, the total value of exports of fresh and dried fruit in the period from 2004 to 2020 amounted to 2,459,776.10 USD, i.e. a total of 3,345,880 tons of fruit were exported. Apples had a dominant share in the structure of exports, followed by peaches, cranberries, blueberries, sour cherries, strawberries and plums. In the same period, 3,776,290.9 tons of fruit were imported, which amounted to 2,553,814.90 USD. The most imported types of fruit were those for the production of which there are no appropriate climatic, soil and other conditions, such as bananas, oranges, lemons and limes in the Republic of Serbia. Goldstein and Khan (1985) emphasize that economic growth strongly stimulates fruit imports and reduces inflation, while Niculae and Costaiche (2016) point out that fruit trade is very important for the development of the national economy, and that increasing fruit production has a positive effect on GDP and at the same time contributes to the reduction of imports.

Given the importance of fruit production, as well as the importance of fruit participation in foreign trade of the Republic of Serbia, the paper continues to investigate the development of exports and imports of fruits in the period from 2004 to 2020 and forecast future values using statistical methodology in the field of time series analysis.

Underlying principles of research

The research problem is related to the importance of foreign trade of fruits of the Republic of Serbia, while the subject of the research includes the analysis of previous and future trends in the value of exports and imports of fruit, as one of the most important agro-industrial products.

The aim of the research is to determine future trends and forecast future values of fruit imports and exports of the Republic of Serbia by applying econometric methodology in the field of analysis of time series variations, i.e. statistical methods of linear trend. The applied descriptive statistical analysis will also contribute to the quality of the research. The results of the conducted research will help to answer the questions: whether the researched values show a constant increase and characteristic variations that repeat over time, with an approximate straight-line tendency in accordance with the linear trend. In accordance with the previously mentioned research elements, general and specific research hypotheses are defined.

General research hypothesis:

H_0: Quantitative indicators of the trends of fruit export and import values of the Republic of Serbia in the period from 2004 to 2020 are suitable for research, since variations of the analyzed phenomenon are observed in a sufficiently long period of time.

H_a: *Quantitative indicators of the trends of fruit export and import values of the Republic of Serbia in the period from 2004 to 2020 are not suitable for research because variations of the analyzed phenomenon are not observed in a sufficiently long period of time.*

Specific research hypotheses:

$H1_{0:}$ Trends in the fruit export and import values of the Republic of Serbia in the period from 2004 to 2020 show a constant increase and characteristic variations that repeat over time and show an approximate straight-line tendency in accordance with the linear trend.

$H1_{a:}$ *Trends in the fruit export and import values of the Republic of Serbia in the period from 2004 to do not show a constant increase and characteristic variations that repeat over time and do not show an approximate straight-line tendency in accordance with the linear trend.*

$H2_{0:}$: The trend line in the case of the fruit export and import values of the Republic of Serbia is increasing, and every year in the period from 2004 to 2020 there is an average annual increase in value.

$H2_{a:}$ *The trend line in the case of the fruit export and import vales of the Republic of Serbia is declining, and every year in the period from 2004 to 2020 there is an average annual decrease in value.*

$H3_{0:}$ By applying the linear trend method, it is possible to predict future trend direction of the fruit export and import values the Republic of Serbia in the period from 2021 to 2030.

$H3_{a:}$ *By applying the linear trend method, it is not possible to predict future trend direction of the fruit export and import values of the Republic of Serbia in the period from 2021 to 2030.*

Literature review

After reviewing the available scientific and professional literature, it was noticed that a very small number of authors dealt with researching previous trends in fruit imports and exports of the Republic of Serbia and forecasting their future values using the mentioned methodology, which further increases the importance of this research study.

Khotamov and Ismoilov (2020) dealt with assessing and forecasting trends in global exports and imports of goods on the international market. They emphasize that research into the import and export trends is crucial for developing countries, and that the correct assessment and prediction of their future trends is extremely important for the growth and development of the national economy.

Matkovski, Erceg, Đokić and Kleut (2018) analyzed the production and foreign trade of berries with special emphasis on comparative advantages in exports. The authors

pointed out that the foreign trade of agricultural and food products is of special importance for the Republic of Serbia due to its high participation in trade as well as in the value of gross domestic product. They also emphasized a very important fact, that agriculture is the only economic sector of the Republic of Serbia that has a positive foreign trade balance.

Lukač-Bulatović, Vukoje and Milić (2017) investigated the most important factors that determine fruit production, with the analysis of the achieved economic results of important fruit species (apple, pear, peach, sour cherry and plum) on agricultural farms in AP Vojvodina. The authors concluded that the highest level of economic justification of production is represented in the case of pears, followed by apples, sour cherries, peaches and plums. The contribution of research is reflected in proposing measures for improving fruit production (planting quality fruit varieties, vertical connection of producers and processors and raising the level of economic security of producers).

Tomašević (2016) researched the state and possibilities of fruit production and export from the Republic of Serbia, with an emphasis on measures to increase them at the macroeconomic and microeconomic level. The author pointed out that fruit production in the Republic of Serbia has an increasing trend, and that fruit has a dominant share in the structure of exports of agricultural and food products. The value of exports of fresh fruits and processed products is conditioned by the volume and structure of domestic production and the degree of adjustment to international market demand. The author notes that in the Republic of Serbia there is no single strategy for fruit exports, that export incentives are insufficient, and that exports, among other things, can be increased by applying an appropriate marketing strategy.

Stegić (2016) identified the analysis of foreign trade of agro-industrial products between the Republic of Serbia and the European Union in the period from 2004 to 2014 as the main goal of his research in order to notice changes in trade relations, conditioned by signing the Stabilization and Association Agreement. The author stated that the primary agricultural products dominate in exports, while the structure of imports includes products of the late stages of processing, but he also notes that fruit appears as a key export and import product in trade with the European Union.

Vlahović and Puškarić (2015) investigated the export of agro-industrial products from the Republic of Serbia to the market of the Russian Federation, given that it was one of the world's largest food importers in the study period. The authors pointed out that it is necessary to increase the share of products of the late stages of processing at the expense of raw materials in the structure of exports, which would condition the optimal use of the capacity of the domestic processing industry and increase export profitability. They also suggest that the engagement of agricultural policy makers should be intensified and that the agricultural producers should be stimulated to form associations in order to increase export quantities, the quality of agricultural products and ensure continuous delivery.

In their next study, Vlahović, Puškarić and Veličković (2015) investigated the trends of apple exports and the foreign trade balance of the Republic of Serbia. The authors

stated that the apple is the leading fruit species in the structure of exports, and that intensifying the export of apples can create a good basis for increasing the total domestic fruit production. The results of the research indicate that apple production tends to grow moderately per year (4.75%), while imports were subject to oscillations due to a number of factors (producer disorganization, lack of working capital, fragmentation of production, etc.), but that in the observed period nevertheless, a positive balance of foreign trade in apples was achieved. However, despite these limitations, several larger, modernly designed plantation complexes have been built in Serbia since 2000, in which current technological solutions for growing new, more yielding apple varieties has been applied (Jeločnik, Ivanović, Subić, 2011).

In their previous studies, Vlahović, Tomić and Kuzman (2011) dealt with the investigating trends of foreign trade of agro-industrial products of the Republic of Serbia with the Republic of Croatia under the CEFTA agreement, and considering the range of opportunities for improving and expanding trade among countries. Based on the results of the research, the authors concluded that the Republic of Serbia must improve its agricultural policy by introducing strategic changes, ensure more favorable procurement of agricultural machinery and equipment for processing agri-food products, and increase the competitiveness of agro-industrial products, especially in foreign markets.

Kuzman, Ivić and Dumonjić (2011) dealt with the same research problem and concluded that the Republic of Serbia recorded a deficit in foreign trade of agro-industrial products with the Republic of Croatia, during the entire observation period. The authors suggested that the trade deficit could be eliminated by improving product quality, improving packaging, applying a marketing concept, and improving production technology.

Drašković, Stošić and Rajković (2011) investigated the production potential and trends in fruit exports of the Republic of Serbia, as a contributing factor in rural development. The authors emphasize the importance of raspberry production as a traditional export product of the Republic of Serbia, but also conclude that there are not enough incentives in this sector, and that the provisions of agricultural policy, which regulate this area, are not clearly defined. It is emphasized that the mentioned shortcomings primarily affect large fluctuations in export prices.

Vlahović, Maksimović and Puškarić (2011) studied the factors that limit the export of fruit from the Republic of Serbia and concluded that the main obstacles to promoting exports of Serbian fruit and fruit products are inadequate quality of fruit varieties and planting material, insufficient knowledge of foreign markets, lack of knowledge about new production technologies, as well as the lack of export associations that would be in charge of establishing stable and long-term relationships with importers. The authors concluded that the strategic goals of the Republic of Serbia should include high-quality production of fresh fruit and increased competitiveness on the international market.

Maksimović (2009) also researched the apple market in the world and in the Republic of Serbia. The author noted that apple producers in Serbia must increase competitiveness at the national and international level, and that it is necessary to intensify production

and apply an integrated concept, introduce modern apple varieties, apply innovative ways of storing products and use modern packaging. In this research, the importance of stable business conditions that would affect the improvement of existing export potentials was especially emphasized.

Research methodology

According to Šošić (2006), a time series is a set of chronologically arranged values of a variable, which represents the phenomenon or a statistical process in time. Depending on the character of the factors that affect a certain phenomenon over time, Horvat and Mijoč (2012) state that the time series consists of several components: trend component, seasonal, cyclical and random (irregular) component. The time series is equal to the product of all the listed components, but it is not necessary for it to contain them all. The trend component is a value that is expressed by a mathematical function and shows the developmental tendency of the phenomenon depending on time. Levine, Stephan, Krenhbiel and Berenson (2009) point out that the trend is a general, long-term upward or downward movement in time series. What is important for the trend is the ability to predict future movements of the phenomenon or feature (Horvat, Mijoč, 2012), i.e. when certain movements are analyzed through the trend, the goal is to discover the laws of development of the phenomenon, and based on that predict its future trend.

Serdar and Šošić (1992) note that if the investigated phenomenon exhibits, in the same time periods, approximately the same absolute change, i.e. decrease or increase, it is considered that its movement is approximately linear and can be expressed by a linear model. In addition to this model showing the linear movement of the time series, Biljan-August, Pivac and Štambuk (2009) also emphasize the possibility of predicting the value of the phenomenon for some future periods.

The linear trend method is very suitable for application in situations when we investigate long-term time series with one-year time periods, which is exactly the case in this study which examines trends in imports and exports of fruits of the Republic of Serbia, annually in the period from 2004 to 2020.

The general form of the linear trend function is:

$$\hat{\mathbf{Y}}\mathbf{t} = a + bx \qquad (1)$$

The time variable x is an independent variable, while the trend value $\hat{Y}$ is a dependent variable in the research. The parameter a represents the value of the function at the origin, and the parameter b is an indicator of the direction of the trend. Serdar (1997) points out that it depends on the sign that this parameter carries whether a continuous increase or decrease in the value of the investigated phenomenon is shown.

The least squares method is one of the methods by which the linear trend equation can be determined, which will be applied in this research. The advantage of its application is that it provides a trend line that is best adapted to the actual data of the time series (Hadživuković, 1989; Pantić et al., 2022).

Since the linear trend describes the development of the phenomenon in terms of average, it is necessary to determine its representativeness, that is, to provide an answer to the question of whether the model explains the movement of the dependent variable Y through time X, and to what extent it explains it. The coefficient of determination is an indicator of the representativeness of a trend model based on analysis of variance. Kovačić (2008) states that the coefficient of determination is defined as the ratio of the total sum of squares of deviations interpreted by the trend model and the total sum of squares of all deviations of the values of the time series Y variable from the arithmetic mean. The formula for calculating the coefficient of determination is:

$$R^2 = \frac{SP}{ST} \qquad (2)$$

The representativeness of the trend model is better when its value is closer to 1, as well as when there are small differences between the original values of the time series and the trend value.

Before applying the described method, a descriptive statistical analysis was performed and the following indicators of fruit exports and imports of the Republic of Serbia were calculated and interpreted: arithmetic mean, minimum, maximum and total values of observed phenomena, median, lower and upper quartile, range of variation, mean absolute deviation, standard deviation and coefficient of variation.

Research results and discussion

Descriptive statistical analysis

In the process of collecting research data, the *desk method* was applied and the secondary data source, i.e. the database of the Statistical Office of the Republic of Serbia, was used. Quantitative data on trends in exports and imports of products belonging to product group 057 - Fruit, fresh or dried (according to the standard international trade classification), in the period from 2004 to 2020 (observation period is 17 years), expressed in US dollars were collected (USD).

Based on the data shown in Table 1, it is concluded that the investigated phenomenon is observed in a sufficiently long period of time, to manifest, in equal time periods (one year) approximately the same absolute change, and that its movement is approximately linear and can be expressed by linear model.

The total value of fruit imports in the Republic of Serbia in the observed period amounted to 2,553,814.90 USD and was slightly higher than the total value of exports. The minimum value was realized in 2004 in the amount of 70,101.30 USD, while the maximum value of imports was realized in 2020 when it amounted to 242,541.60 USD.

The total value of fruit exports from the Republic of Serbia in the observed period amounted to 2,459,776.10 USD. The minimum value was realized in 2005 in the amount of 20,301.90 USD, while the maximum value of exports reached 2017,

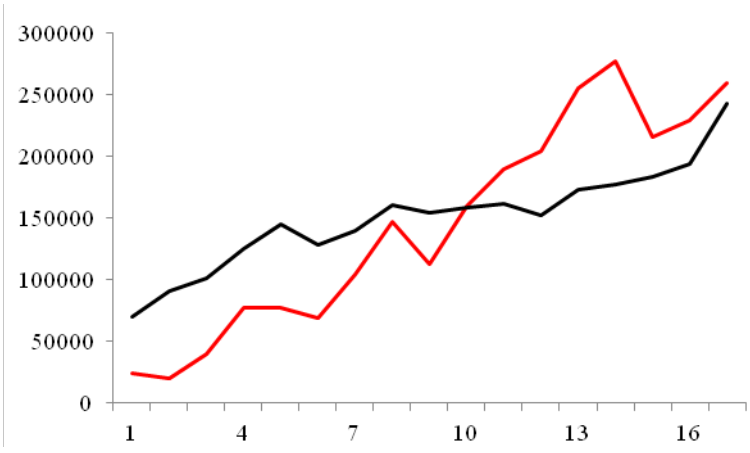
when it amounted to 276,849.50 USD. The average annual value of fruit imports was 150,224.41 USD, and the value of exports was slightly less - 144,692.7 USD.

Table 1. Quantitative trends in fruit exports and imports of the Republic of Serbia in the period from 2004 to 2020 in thousands of USD

Year	Value of exports	Value of imports	Balance	Coverage ratio (%)
2004	24050,90	70101,30	-46050,40	34
2005	20301,90	90426,70	-70124.80	22
2006	39279,80	101463,90	-62184,10	39
2007	77559,40	125004,40	-47445,00	62
2008	77627,60	145028,20	-67400,60	54
2009	68363,00	127771,80	-59408,80	54
2010	104502,30	139401,50	-34899,20	75
2011	146685,00	160001,80	-13316,80	92
2012	112336,00	153944,00	-41608,00	73
2013	159527,10	158286,10	1241,00	101
2014	189537,80	161140,60	28397,20	118
2015	203937,00	151787,90	52149,10	134
2016	255109,40	173147,80	81961,60	147
2017	276849,50	177166,60	99682,90	156
2018	215643,60	183002,70	32640,90	118
2019	228833,00	193598,00	35235,00	118
2020	*259632,80*	*242541,60*	*17091,20*	*107*

Source: Review of authors based on data from the Statistical Office of the Republic of Serbia (www.stat.gov.rs)

Figure 1. Trends in fruit imports and exports of the Republic of Serbia in the period from 2004 to 2020



Source: Review of authors based on data from the Statistical Office of the Republic of Serbia

Note: Red line is export and black line is import.

Based on the data presented in the Graph 1, it can be concluded that in the period from 2004 to 2013, fruit imports exceeded export values. The value of exports increased sharply in 2013, compared to 2012, while in the same period imports also showed growth that was much lower in intensity. From 2013 until the end of the research period, the value of fruit exports from the Republic of Serbia to other markets was higher than imports, and the coverage ratio in that period exceeded 100%.

Based on the indicators of the descriptive statistical analysis of fruit imports of the Republic of Serbia, the following can be concluded: 50% of the realized value of imports was more than 153,944.00 USD, 25% of the value less than or equal to 127,771.80 USD, while 25% of the value was greater than or equal to 173,147.80 USD. The range of variation was 172,440.30 USD, then the average absolute deviation of individual import values from the average annual value reached 29,690.95 USD, while the average deviation of individual fruit import values from the average annual value was 39,617.97 USD.

Table 2. Descriptive statistical analysis of fruit exports and imports of the Republic of Serbia in the period from 2004 to 2020

Indicator	Export	Import
Number of observation periods	17	17
Minimum	20.301,90	70.101,30
Maximum	276.849,50	242.541,60
Total	2.459.776,10	2.553.814,90
Arithmetic mean	144.692,71	150.224,41
Median	146.685,00	153.944,00
The lower quartile	77.559,40	127.771,80
The upper quartile	215.643,60	173.147,80
Range of variation	256.547,60	172.440,30
Mean absolute deviation	74.531,86	29.690,95
Standard deviation	83792,31	39.617,97
Coefficient of variation	58%	26%

Source: Review of authors based on data from the Statistical Office of the Republic of Serbia (www.stat.gov.rs)

The variability in the value of fruit imports of the Republic of Serbia in the period from 2004 to 2020 was relatively weak (26%).

Based on the indicators of descriptive statistical analysis of fruit exports of the Republic of Serbia, the following can be concluded: 50% of the realized value of exports was more than 146,685.00 USD, 25% of value was less than or equal to 77,889.40 USD, while 25% of value was greater than or equal to 215,643.60 USD. The range of variation was 256,547.60 USD, then the average absolute deviation of individual import values from the average annual value reached 74,531.86 USD, while the average deviation of individual values of fruit imports from the average annual value was 83,792.31 USD. The variability in the value of fruit imports of the Republic of Serbia in the period from 2004 to 2020 was relatively strong (58%).

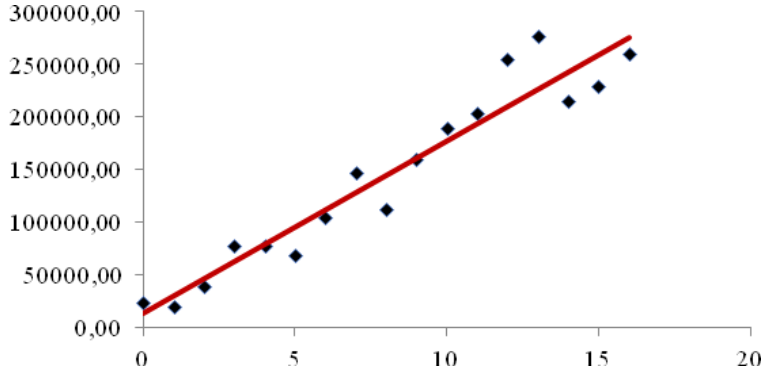
Linear trend method

The presented data indicate that the time series of data on the value of exports and imports of fruits of the Republic of Serbia shows an approximately linear movement, and therefore can be expressed by a linear model. Using the least squares method, the linear trend equation was determined, so that the starting year of the researched period, 2004, was chosen as the starting point. The unit for x (base time unit) is one year, and the unit for y (feature value) is one thousand USD. The equations of the linear trend of fruit exports and imports of the Republic of Serbia are as follows:

Export: $\hat{Y}t = 13348 + 16418x$ (3)

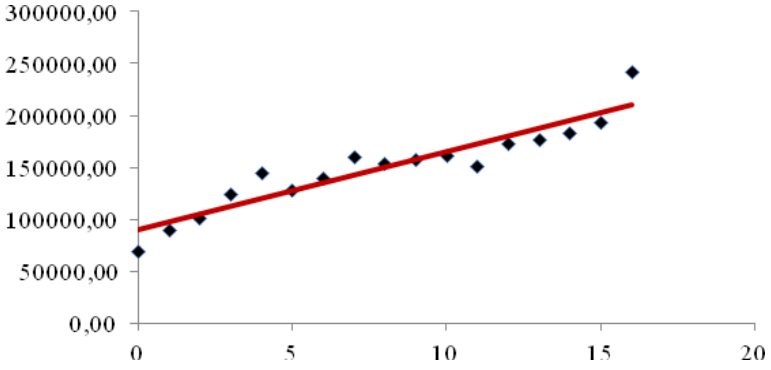
Import: $\hat{Y}t = 89870 + 7544x$ (4)

Figure 2. The linear trendline of fruit exports from the Republic of Serbia in the period from 2004 to 2020



Source: Presented by the authors based on their own calculations

Figure 3. The linear trendline of fruit imports to the Republic of Serbia in the period from 2004 to 2020



Source: Presented by the authors based on their own calculations

Based on the set equations, it is concluded that the theoretical value of the trend in the starting point is 13348 in the case of exports, and 89870 in the case of fruit imports. This value indicates the point at which the trend line intersects the coordinate axis Y in a rectangular coordinate system. We also find out how much was the theoretical, expected value of exports, that is, imports of fruits of the Republic of Serbia on January 1, 2004. In each observed year in the period from 2004 to 2020, the value of fruit exports from the Republic of Serbia to other markets increased by an average of 16,418 USD, while the value of imports increased by an average of 7,544 USD. These data also indicate that in both cases (exports and imports) the trend line is increasing.

By calculating the average annual rate of change (s = b/average y * 100) we conclude that during the research period the value of fruit exports increased by an average of 11.35% per year, while the value of fruit imports increased by an average of 5.02% per year.

Given that the linear trend model describes the development of the phenomenon in terms of average, it is necessary to determine its representativeness. By calculating the value of the coefficient of determination ($R^2 = 0.921$ for exports and $R^2 = 0.870$ for imports) it is concluded that 92.10% of changes in the value of fruit exports from the Republic of Serbia and 87% of changes in the value of fruit imports of the Republic of Serbia are explained by the presented linear trend model. The representativeness of the linear trend model is very high in both cases.

At the end of the research, the forecast of future values of exports and imports of fruits of the Republic of Serbia for the next ten-year period, i.e. until 2030, is performed. The possibility of extrapolating data is one of the most common reasons for studying a trend in the movement of a phenomenon. In this context, Hadživuković (1989) notes that extrapolation is formally performed with the assumption that the phenomenon will continue in the future as in the past, which can be concluded on the basis of presented data on trends in exports and imports of fruits of the Republic of Serbia, since for the last 17 years, no significant oscillations have been recorded, with the possibility of taking into account a certain moment that will have effect in the future, but whose effect was not present before.

Based on the research of current trends in exports and imports of fruits of the Republic of Serbia, it is predicted that in the next ten years the growth trend of export and import values will continue with the coverage of imports by exports ranging from 134% to 154%. It is predicted that, in the period from 2021 to 2030, the value of fruit exports on an annual level will exceed import values, and that a positive foreign trade balance will be achieved when it comes to fruit trade. The values of exports and imports of fruits of the Republic of Serbia will continue to grow in the coming period, with the growth rate of exports being higher than the growth rate of imports.

Observing the last year of extrapolated values, it is concluded that the value of fruit exports from the Republic of Serbia to foreign markets will be 1.7 times higher, i.e. that the value of fruit imports will be 1.18 times higher than the values achieved ten years ago (during 2020).

Table 3. Overview of previous trends and projected values of fruit exports and imports of the Republic of Serbia in the period from 2021 to 2030 using the linear trend method

Year	(Xti)	Export (Yti)	Year	(Xtu)	Import (Ytu)	Balance	Coverage ratio (%)
2004	0	24050,90	2004	0	70101,30	-46050,40	34
2005	1	20301,90	2005	1	90426,70	-70124.80	22
2006	2	39279,80	2006	2	101463,90	-62184,10	39
2007	3	77559,40	2007	3	125004,40	-47445,00	62
2008	4	77627,60	2008	4	145028,20	-67400,60	54
2009	5	68363,00	2009	5	127771,80	-59408,80	54
2010	6	104502,30	2010	6	139401,50	-34899,20	75
2011	7	146685,00	2011	7	160001,80	-13316,80	92
2012	8	112336,00	2012	8	153944,00	-41608,00	73
2013	9	159527,10	2013	9	158286,10	1241,00	101
2014	10	189537,80	2014	10	161140,60	28397,20	118
2015	11	203937,00	2015	11	151787,90	52149,10	134
2016	12	255109,40	2016	12	173147,80	81961,60	147
2017	13	276849,50	2017	13	177166,60	99682,90	156
2018	14	215643,60	2018	14	183002,70	32640,90	118
2019	15	228833,00	2019	15	193598,00	35235,00	118
2020	16	259632,80	2020	16	242541,60	17091,20	107
2021	17	292455,25	2021	17	218122,67	74332,58	134
2022	18	308873,31	2022	18	225666,92	83206,41	137
2023	19	325291,37	2023	19	233211,17	92080,20	139
2024	20	341709,43	2024	20	240755,42	100954,01	142
2025	21	358127,49	2025	21	248299,67	109827,82	144
2026	22	374545,55	2026	22	255843,92	118701,63	146
2027	23	390963,61	2027	23	263388,17	127575,44	148
2028	24	407381,67	2028	24	270932,43	136449,24	150
2029	25	423799,73	2029	25	278476,68	145323,05	152
2030	26	440217,79	2030	26	286020,93	154196,86	154

Source: Review of authors based on data from the Statistical Office of the Republic of Serbia (www.stat.gov.rs)

Conclusion

By applying a set of methodological procedures specific for the analysis of time series variations, the truthfulness of defined hypotheses, general and specific, was tested. The results of the descriptive statistical analysis provided valuable insights into the value of exports and imports of fruits of the Republic of Serbia in the period up to 2020. The obtained research results, which were obtained by applying the analysis of the time series variations, indicated the acceptance of null, and the rejection of the alternative hypothesis, in the case of the general hypothesis and all groups of specific hypotheses, which contributed to relevant and impartial research conclusions. Therefore, with the high representativeness of both models of the linear trend, the authors state the following:

- Quantitative indicators of trends in the value of exports and imports of fruits of the Republic of Serbia in the period from 2004 to 2020 are suitable for research as variations of the analyzed phenomenon are observed over a sufficiently long period of time.
- The mentioned trends show a constant increase and characteristic variations that are repeated over time and show an approximate straight-line tendency in accordance with the linear trend.
- The trend line of the value of exports and imports of fruits of the Republic of Serbia is increasing, and every year in the period from 2004 to 2020 there was an average annual increase in both values.
- By applying the linear trend method, the future trend direction the fruit export and import values of the Republic of Serbia in the period from 2021 to 2030 is predicted.

It is concluded that the trend of growth in the value of exports and imports of fruits of the Republic of Serbia will continue in the future, with more intensive growth in the value of exports compared to imports. Also, due to the coverage of imports by exports, it is expected that trade in fruit will cause a surplus in the foreign trade balance of the Republic of Serbia, at least when it comes to this type of agro-industrial products. The contribution of this research study is multiple, in the scientific sense it expands the scope of existing scientific literature, given that research studies that have addressed this issue are very rare, while in practical terms it provides guidance to producers and exporters of fruits and agricultural policy makers. especially in terms of encouraging fruit exports from the Republic of Serbia in the coming period.

Conflict of interests

The authors declare no conflict of interest.

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