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## Poland's competitiveness in foreign trade in apples

**Abstract.** Poland is one of the largest global producers and particularly exporters of apples. The export is of great importance to domestic producers of these fruits. The objective of the article was to assess Poland's competitiveness in world trade in apples in the years 2003–2013. In connection with that, in an innovative way ten mutually complementary indices of ex-post competitiveness have been calculated for Poland and analysed. The study presents ranges in which the values of particular indices of competitiveness may be comprised. It also explains the impact which re-export may have on the levels of some of these indices, making it difficult for their correct interpretation. The studies have demonstrated that in the analysed period, Poland was characterised by high and growing competitiveness in foreign trade in apples, particularly in the years 2012–2013.

**Key words:** competitiveness, foreign trade, export, import, apples, Poland

## Introduction

Economic competition, i.e. rivalry aimed at achieving the benefits from business activity on the domestic and international market [Bossak, Bieńkowski 2004] is one of the basic economic mechanisms [Pawlak, Poczta 2008]. The concept of competitiveness is derived from competition and is an element thereof [Skawińska 2002], although there is no universally accepted definition of competitiveness [Bossak 1984; Bieńkowski 1995; Kuciński 2000; Misala 2007]<sup>4</sup>. However, we may assume that competitiveness shows the position of an operator in relation to other market participants [cf. Adamkiewicz 1999]. Therefore, competitiveness is a concept assessing operators from the point of view of their performance, as well as their ability to achieve benefits in the future. A comparison of economic performance achieved by competitors in the global economy, thus an ex-post comparison, is used to assess past and current international competitiveness [cf. Bossak, Bieńkowski 2004]. This is a relative concept as the assessment of competitiveness requires the adoption of an appropriate reference point, e.g. the past status or economic achievements of competitors. It is necessary to select assessment criteria (measures) in an appropriate manner [Bieńkowski 1995], taking into account the disadvantages of various indices adopted to measure competitiveness [by Misala 2003]. However, many indices of competitiveness complement each other. Thus, while drawing conclusions on the basis of results obtained using a limited number of indices may be encumbered with errors, the application of the larger number of them and taking into account their interdependencies,

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<sup>4</sup> The above-mentioned authors have recorded several hundreds of definitions of competitiveness.

particularly in a longer term, allows the proper assessment of competitiveness. [Nosecka et al. 2011].

The importance of the international competitiveness of Polish producers has grown as a consequence of globalisation, which has changed their business environment from the national market to the global arena. [Woś 2003]. Nevertheless, conditions of competition may be distorted due to bad political relations between the country and the states that are the major international outlets for goods of a given sector [Porter 1996].

The production of apples in Poland has significantly increased since the country's accession to the EU [Statistical Yearbook of Agriculture... 2007–2013; Wyniki... 2014]. Exports allowed the management of surpluses of those fruits and was an important source of income. In the longer term, sending surpluses of the domestic production of apples abroad is, however, possible only when this production is competitive on the international market. High competitiveness of Poland in foreign trade in apples is therefore a prerequisite for producing a significant part of these fruits domestically for export. This justifies the purpose of this study, i.e. determination of Poland's competitiveness in world trade in apples in the period immediately before and after the country's accession to the EU, i.e. in the years 2003–2013.

## Material and methodology of the study

The assumed study objective was implemented using secondary materials, i.e. statistical data on the market output of apples in Poland [IERiGŻ-PIB 2014], Polish foreign trade in apples and agri-food products in general [CAAC 2003–2013] and world foreign trade in apples and agri-food products in general [UN Comtrade 2014.] The data used regarding foreign trade in apples refer to the products falling within CN code 0808 10 [Regulation 1987, 2002, 2003]. In the study, Polish foreign trade is understood as an exchange of goods with the EU Member States and third countries. The material used regarding the Polish export and import includes, therefore, the total turnover with all countries of the world.

In order to implement the study objective, the following mutually complementary indices of ex-post competitiveness in foreign trade in apples have been calculated for Poland and analysed:

### 1. *Quantitative/value balance of foreign trade (TB)*

$$TB = E_{Pa} - I_{Pa} \quad (TB < 0 \text{ or } TB \geq 0)$$

where:  $E_{Pa}$  – export of apples from Poland (thousand tonnes/million USD),  $I_{Pa}$  – import of apples to Poland (thousand tonnes/million USD).

In terms of the open economy, the positive balance of foreign trade in a given product, continuing for a longer time, may attest to international competitiveness of the country with regard to this product [Nosecka 2013].

### 2. *Trade coverage index (TC)*

$$TC = \frac{E_{Pa}}{I_{Pa}} \quad (TC \geq 0)$$

where:  $E_{Pa}$  – export of apples from Poland (million USD),  $I_{Pa}$  – import of apples to Poland (million USD).

The value of the TC index greater than 1 means that the country has a relative internal advantage over competitors [Szczepaniak 2013], but also reflects competitiveness revealed in the export dynamics [Nosecka 2013].

### 3. Share in global export (SGE)

$$SGE = \frac{E_{Pa}}{E_{Wa}} \times 100\% \quad (0\% \leq SGE \leq 100\%)$$

where:  $E_{Pa}$  – export of apples from Poland (million USD),  $E_{Wa}$  – world export of apples (million USD).

It is believed that the increasing share in the world export of a given product means improving of international competitiveness of the country with regard to this product [Zawiślińska 2003], as far as the increase in the value of this index does not result from the increasing re-export only.

### 4. Export orientation index (EO)

$$EO = \frac{E_{Pa}}{P_{Pa}} \times 100\% \quad (EO \geq 0\%)$$

where:  $E_{Pa}$  – export of apples from Poland (million USD),  $P_{Pa}$  – market output of apples in Poland (million USD).

The increasing level of the EO index may attest to growing international competitiveness only when the share of the country in the world export of a given product (SGE) also increases [Nosecka 2013], and provided that the increase in the value of the EO index (and thus the SGE index) is not caused by the increasing re-export only.

### 5. Specialisation index (SI)

$$SI = \frac{E_{Pa}}{E_P} \div \frac{E_{Wa}}{E_W} \quad (SI \geq 0)$$

where:  $E_{Pa}$  – export of apples from Poland (million USD),  $E_P$  – export of agri-food products from Poland (million USD),  $E_{Wa}$  – world export of apples (million USD),  $E_W$  – world export of agri-food products (million USD).

The SI index compares the share of a given product in the agri-food export of the country with the share of this product in the world agri-food export. The SI index values greater than 1 may be indicative of high competitiveness [Pawlak 2013], as long as they are not the result of the large re-export only.

### 6. Share in global import (SGI)

$$SGI = \frac{I_{Pa}}{I_{Wa}} \times 100\% \quad (0\% \leq SGI \leq 100\%)$$

where:  $I_{Pa}$  – import of apples to Poland (million USD),  $I_{Wa}$  – world import of apples (million USD).

The decreasing share in the world import of a given product may mean improving of competitiveness of the country with regard to this product [Pawlak, Poczta 2011].

### 7. Import penetration index (IP)

$$IP = \frac{I_{Pa}}{P_{Pa} - E_{Pa} + I_{Pa}} \times 100\% \quad (IP \geq 0\%^5 \text{ or } IP < 0\%^6)$$

where:  $I_{Pa}$  – import of apples to Poland (million USD),  $P_{Pa}$  – market output of apples in Poland (million USD),  $E_{Pa}$  – export of apples from Poland (million USD).

<sup>5</sup> The IP index assumes values greater than 100% e.g. when the country which does not produce a given product re-exports this product.

<sup>6</sup> The negative value of the IP index is theoretically possible e.g. in a situation when the country which does not produce a given product would re-export the product imported in the previous year and this re-export would be greater than the import of this product in the given year.

The IP index shows the share of the import in the supply of a given product on the domestic market. The low and decreasing value of the IP index, particularly along with the low and decreasing share in the world import may attest to high and increasing international competitiveness of the country with regard to a given product [Nosecka 2013].

8. *Relative revealed comparative export advantage index (XRCA)*

$$XRCA = \frac{E_{Pa}}{E_{Wa}} \div \frac{E_{P\neq a}}{E_{W\neq a}} \quad (XRCA \geq 0)$$

where:  $E_{Pa}$  – export of apples from Poland (million USD),  $E_{Wa}$  – world export of apples (million USD),  $E_{P\neq a}$  – export of agri-food products from Poland exclusive of apples (million USD),  $E_{W\neq a}$  – world export of agri-food products exclusive of apples (million USD).

9. *Relative import penetration index (MRCA)*

$$MRCA = \frac{I_{Pa}}{I_{Wa}} \div \frac{I_{P\neq a}}{I_{W\neq a}} \quad (MRCA \geq 0)$$

where:  $I_{Pa}$  – import of apples to Poland (million USD),  $I_{Wa}$  – world import of apples (million USD),  $I_{P\neq a}$  – import of agri-food products to Poland exclusive of apples (million USD),  $I_{W\neq a}$  – world import of agri-food products exclusive of apples (million USD).

10. *Relative trade advantage index (RTA)*

$$RTA = XRCA - MRCA \quad (RTA < 0 \text{ or } RTA \geq 0)$$

If the RTA index is positive and the XRCA index is also greater than 1, it attests to high competitiveness of the country with regard to a given product when compared to other countries of the world in total. On the other hand, the negative value of the RTA index and also the value of the MRCA index greater than 1 means that the country shows the absence of competitiveness. In other cases, the results of the analysis are not unambiguous [Frohberg 2000].

## Production of apples in Poland on the background of the world market

Apples are fruits enjoying increasing recognition of consumers in the world. It is evidenced particularly by the increase in their global production. In the years 2003–2012, the global production of apples increased from 58.2 million tonnes to 76.4 million tonnes, i.e. by 31%. The increase in the global production of apples was largely due to the dynamically increasing production in China, the world's main producer of these fruits. In the years 2003–2012, the production of apples in that country increased from 21.1 million tonnes to 37 million tonnes and the share of the Chinese production in the global production increased from 36% to 48% [FAOSTAT 2014]. The increase in the production in China resulted from the increasing demand for apples in that country. In the years 2003–2012, the consumption of apples in China increased from 16.6 million tonnes to 32.2 million tonnes, thus by 94% [Indexmundi 2014]. After China, large but much smaller producers of apples were the United States and Turkey, whose share in the global production of these fruits in 2012 amounted to 5% and 4%, respectively [FAOSTAT 2014].

In 2012, Poland was the world's fourth producer of apples and the EU's largest producer (with the share of 4% in the world harvest and the share of 26% in the EU harvest) [FAOSTAT 2014]. In the years 2003–2013, the production of apples in Poland was subject to significant fluctuations (the particularly large decrease in the production took place in 2007, due to frost [Rynek...2007]), however, it was characterised by an upward

trend, especially in the last three years of that period. In 2013, 3.1 million tonnes of apples were picked when compared to 2.4 million tonnes in 2003. In the analysed period, apples had, on average, a share of about 70% for harvest of all fruit in the country [Statistical Yearbook of Agriculture... 2007–2013; Wyniki... 2014]. The growing production of apples in Poland was a resultant of market factors and structural transformations. The large-scale introduction of dwarf orchards, the increase in the area of cultivation of apple trees and the creation of adequate logistic facilities in the form of storage and sorting and packaging equipment made it possible to increase production and improve the commercial offer.

Significant investment projects were possible, *inter alia*, thanks to the fact that producers of apples, to a much larger extent than producers of other fruit and vegetables in Poland, made use of EU and national support funds with regard to the creating and functioning of producer groups and organisations. In particular, this refers to the funds allocated for the implementation of eligible investment projects included in the plans of achieving recognition of producer groups created within the framework of the common organisation of the fruit and vegetable market in the EU. It is estimated that the share of producer groups and organisations in supplies of apples to the domestic market and foreign markets at the end of the analysed period amounted to about 30%, and in the supply of other types of fruit and vegetables it did not exceed 10% [Nosecka 2013].

The development of producer groups contributed to a reduction in production costs, which enabled price competition mainly on the Commonwealth of Independent States (CIS) and also the EU market. In addition, the quality of dessert apples has improved, which also enabled an increase in the apple export. Also, the well-developed processing industry in Poland allowed better management of industrial apples. The large export demand for concentrated apple juice, for the production of which most harvests of industrial apples were used, was also an important factor stimulating the development of the production of apples in the country.

## Characteristics of Polish foreign trade in apples

In the last years of the analysed period, the annual average export of apples in the world oscillated within the limits of 10% of their production, which gave apples, in terms of volume, third place among the most important export items of global horticulture [Światowy... 2013]. In the years 2003–2013, the world export of apples amounted to, on average, about 7.5 million tonnes. By 2012, the world's first exporter of apples was China, which exported 0.6–1.2 million tonnes of apples a year. In 2013, Poland became the world's largest exporter of apples and the further places were occupied by: China, USA, Chile and Italy [UN Comtrade 2014]. In recent years, the world's largest importer was Russia, which imported 1.0–1.2 million tonnes of apples a year. Further places were occupied by: United Kingdom, Germany, the Netherlands and Mexico [Światowy... 2013].

The lack of a clear increasing tendency of production and export in the leading countries exporting apples in the world, and particularly the decreasing supply in the last years on the international market from China, constituted the profitable external market conditions for the growth of apple export from Poland [Nosecka 2014]. Finally, in the analysed period, Polish foreign trade in apples recorded a dynamic growth in volume, and particularly, in the value. The export of apples from Poland increased from 353 thousand

tonnes in 2003 to 1,230 thousand tonnes in 2013, i.e. by almost 3.5 times. The value of the Polish export of apples increased from USD 68 million to USD 591 million, i.e. by more than 7 times. The scale of the import of apples to Poland was incomparably lower. Admittedly, in the years 2003–2013 the import of apples to Poland increased from 14 thousand tonnes to 42 thousand tonnes, but in the last two years of that period a decline was recorded [CAAC 2003–2013]. That import was only a supplement to the domestic offer [Nosecka 2013].

The main foreign outlets for Polish apples were the CIS countries, mainly Russia. In 2013, the export of apples to that country amounted to 676 thousand tonnes (almost 55% of the total export volume of these fruits). Among the other CIS states, significant quantities of apples were exported to Belarus (145 thousand tonnes), Ukraine (53 thousand tonnes) and Kazakhstan (47 thousand tonnes.) In most recent years of the analysed period, the export of apples to Russia, Belarus and Kazakhstan has been characterised by a significant growth dynamic. Only the export to Ukraine declined. In 2013, a large recipient of Polish apples was also the EU countries, to which 289 thousand tonnes of apples were sent (23% of the total export of these fruits), mainly to Germany (78 thousand tonnes), Romania (34 thousand tonnes), France (27 thousand tonnes) and Belgium (19 thousand tonnes) [CAAC 2003–2013].

### Analysis of Poland's competitiveness in foreign trade in apples

In the analysed period, i.e. in the years 2003–2013, the Polish foreign trade balance (TB) in apples was positive and characterised by an upward trend, while the dynamics of its growth in terms of value was greater than in terms of quantity (Table 1, Fig. 1). The value balance increased from USD 62 million in 2003 to USD 569 million in 2013 (i.e. by 9 times), and quantitative balance – from 339 thousand tonnes to 1,188 thousand tonnes (i.e. by 3.5 times.) The largest increase in the surplus of trade in apples was recorded by Poland in the years 2012–2013. The trade balance, positive and improving in the years 2004–2013, to a very large extent attests to the high and increasing competitiveness of Poland in world trade in apples.

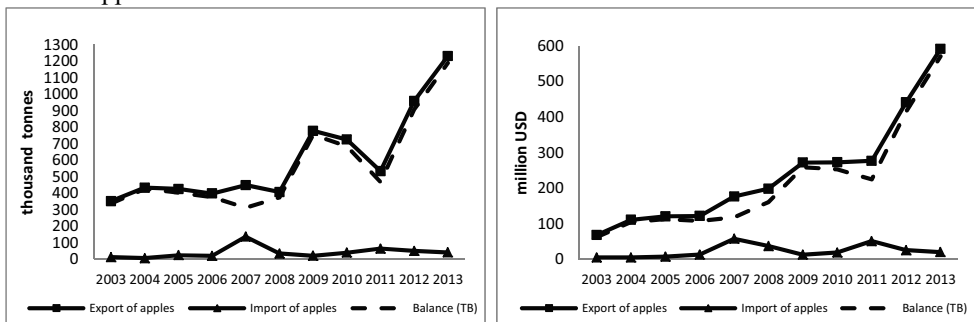


Fig. 1. Polish foreign trade in apples

Source: own elaboration pursuant to the CAAC data and IERiGŻ-PIB calculations.

In the years 2004–2013, the value of the trade coverage index (TC) was characterised by an upward trend – it increased by 2.5 times, although it was subject to very large fluctuations (Table 1, Fig. 2). The TC index had the highest value (27) in 2013 and the lowest (3) in 2007. In 2007, the level of the TC index was the lowest, which resulted from the above-mentioned decline in domestic production. Throughout the analysed period, the TC index was significantly greater than 1, which shows that Poland has a relative internal advantage over foreign competitors. The large and increasing value of the TC index reflects high and improving competitiveness of Poland in foreign trade in apples, manifesting itself in the dynamics of export. Such a level of the TC index also means a small and decreasing share of re-export in the entire export. Special attention should be paid to the significant increase in the value of the TC index in the years 2012–2013.

Table 1. Indices of Poland's competitiveness in world trade in apples

Index	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
TB (thousand tonnes)	338,6	426,2	403,8	377,2	311,7	375,0	754,9	684,0	468,3	906,9	1 188,1
TB (million USD)	61,8	105,5	112,8	108,0	117,5	159,8	258,3	252,4	224,0	412,9	568,9
TC	10,3	19,3	14,2	8,5	3,0	5,1	19,3	13,2	5,2	15,5	26,6
SGE (%)	2,0	2,9	3,1	2,7	3,2	3,1	5,0	4,3	3,9	6,3	8,1
EO (%)	16,2	25,4	26,5	19,5	49,2	17,2	58,7	55,9	26,5	67,4	55,5
SI	2,3	2,7	2,4	1,9	2,1	2,0	3,1	2,7	2,5	3,8	4,2
SGI (%)	0,2	0,1	0,2	0,3	1,0	0,6	0,3	0,4	0,8	0,4	0,3
IP (%)	1,8	1,7	2,5	2,8	24,5	3,9	6,9	8,8	6,4	11,7	4,5
XRCA	2,4	2,8	2,4	1,9	2,1	2,0	3,1	2,7	2,6	3,9	4,3
MRCA	0,3	0,2	0,2	0,3	0,9	0,5	0,2	0,3	0,6	0,3	0,2
RTA	2,1	2,6	2,2	1,6	1,2	1,5	2,9	2,4	2,0	3,6	4,1

Source: own elaboration pursuant to the data from UN, GUS, CAAC and IERiGŻ-PIB calculations.

In the years 2004–2013, the share of Poland in the global export of apples (SGE) showed an upward trend – in 2013 it was 4 times higher than in 2003 and amounted to 8%. This index increased most in the last two years of that period (Table 1, Fig. 2). The increase in the level of the SGE index not resulting from the growing importance of re-export (which was established in case of the TC index) also means improvement of Poland's competitiveness in trade in apples.

In the analysed period, the upward trend was also characteristic of the value of the export orientation index (EO) – it increased by almost 3.5 times. However, it was subject to significant fluctuations (Table 1, Fig. 2). The increasing value of the EO index, with the above-mentioned increase in the share in the world export (SGE), additionally confirms improved competitiveness of Poland in foreign trade in apples.

In the analysed period, the level of the specialisation index (SI) exceeded 1 (Table 1, Fig. 2). That index showed an upward trend and in 2013 was nearly 2 times higher than a decade earlier, with the largest increase occurring in the years 2012–2013. Such value of the SI index confirms high and improving competitiveness of Poland in world trade in apples.

In the analysed period, the share of Poland in the global import of apples (SGI) was at the similar level and did not exceed 1% (Table 1, Fig. 2). That share significantly decreased in the years 2012–2013.

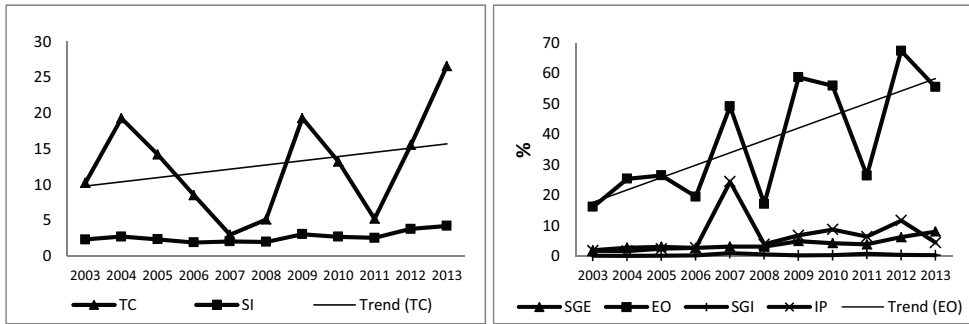


Fig. 2. Trade coverage index (TC), specialisation index (SI), export orientation index (EO), import penetration index (IP), Poland's share in the global export (SGE) and import of apples (SGI)

Source: own elaboration pursuant to the data from UN, GUS, CAAC and IERiGŻ-PIB calculations.

In the years 2004–2013, the value of the import penetration index (IP) increased, but in the analysed period, apart from 2007, it did not exceed 12% (Table 1, Fig. 2). The relatively low level of the IP index with the decrease in the share in the world import (SGI) over the period 2012–2013 confirms the increase in competitiveness of Poland in foreign trade in apples at that time.

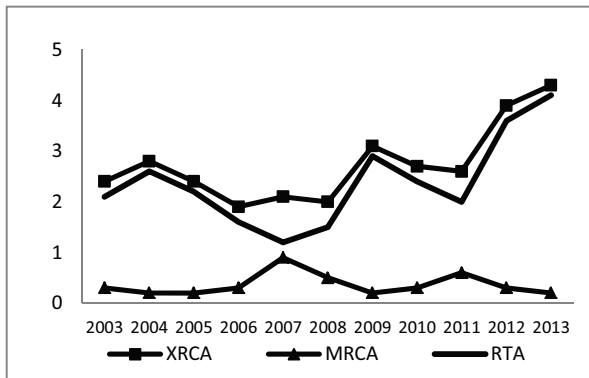


Fig. 3. The relative revealed comparative export advantage index (XRCA), relative import penetration index (MRCA) and relative trade advantage index (RTA) of Poland in world foreign trade in apples

Source: own elaboration pursuant to the data from UN, GUS, CAAC and IERiGŻ-PIB calculations.

In the entire analysed period, the relative revealed comparative export advantage index (XRCA) assumed values greater than 1 and also, the relative trade advantage index (RTA) was positive (Table 1, Fig. 3). Both indices were characterised by an upward trend and increased almost twice at that time. The largest increase in the level of the XRCA and RTA indices was recorded in the years 2012–2013. Such values of the XRCA and RTA indices evidence high and improving competitiveness of Poland in foreign trade in apples.



## Conclusions

In the years 2003–2013, the foreign trade balance (TB), trade coverage index (TC), specialisation index (SI), relative revealed comparative export advantage index (XRCA) and relative trade advantage index (RTA) assumed values attesting to high competitiveness of Poland in foreign trade in apples. The above indices as well as the share in the global export (SGE) and export orientation index (EO) in the years 2004–2013 were characterised by an upward trend which indicates the improvement in competitiveness. However, in that period the import penetration index (IP) also increased, although it was still relatively low. Also, the Polish share in the global import of apples (SGI) was low. The most significant increase in the level of TB, TC, SI, XRCA, RTA, SGE and EO indices, with the simultaneous decrease in the value of the SGI index, was recorded in the years 2012–2013.

The presented results of the analysis clearly indicate the high and improving competitiveness of Poland in world trade in apples in the years 2003–2013, in particular, in the last two years of that period. However, the Russian embargo on the import of EU apples, applicable from August 2014, may significantly distort the conditions of competition by affecting adversely the competitiveness of Poland in foreign trade in apples. Therefore, it seems justified to continue the research on international competitiveness of Poland in terms of apple production in the situation of market restrictions.

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