Competitiveness of dried sector: A case study of world and Turkey

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Abstract: The study aimed to reveal the competitiveness of the world dried sector for some selected products such as dried apples, prunes, apricots, figs, and grapes. In the study, the data was subjected to the Revealed Comparative Advantage (RCA), Relative Export Advantage (RXA), Relative Import Advantage (RMA), Relative Trade Advantage (RTA) and Relative Competitiveness (RC) indices. RCA is an index developed by Balassa to determine the competitiveness of a specific country for selected products or goods. To demonstrate the economic outlook for the world dried sector, the 2007 to 2017 data of China, USA, Chile, Germany, Iran, the Netherlands, South Africa, France, Uzbekistan, Argentina, Spain, Turkey, and India were compared, these countries dominating the sector of selected dried agricultural products. The results demonstrated that the world dried sector is very responsive to economic crises and to local currency rate. The RCA index was found to be 4.66 in 2007 for Turkey and it decreased to 4.45 by 2009 during the world economic crisis. The other breaking point was 2013 when Turkey experienced both economic and political crises.

Keywords: Revealed Comparative Advantage (RCA); Relative Export Advantage (RXA); Relative Import Advantage (RMA); Relative Trade Advantage (RTA) and Relative Competitiveness (RC); Turkey; dried sector

Dried fruit and vegetables are highly nutritious and have become more popular in daily diets. One piece of dried fruit contains nearly the same amount of nutrients as fresh fruit and vegetables. Dried fruit contains up to 3.5 times the fiber, vitamins and minerals of fresh fruit and vegetables. The higher demand for vitamin- and mineral-rich foods across the world increases the global dried fruits market, which is expected to grow in the near future. The global fruit markets have been estimated to be valued at about USD 7.255 billion for 2018 (Transparency Market Reseach 2020). The fruits and vegetables are dried as whole products and then processed into sliced, granulated and powder forms. Countries and farmers around the world are leaning to increase the value of their foods by drying the fruits and vegetables. The dried sector is helping mostly the developing countries to improve their economic status by exporting the products.

Turkey is one of the developing countries that are candidates for European Union membership. In the last decade, the country improved its economy despite the difficulties encountered in that period. According to current data, Turkey is the 2nd largest economy in Europe and the 9th country in the world in terms of the agricultural economy. It boosted its agricultural exports from USD 8 billion to USD 17.7 billion between 2002 and 2018. Turkey is one of the most important producers and exporters of dried fruit. The Turkish dried sector aims to raise its exports from 11% to 25% of Turkish agricultural exports by the year 2023 (Istanbul Exporters Association 2010).

The agriculture sector is the backbone of the economic system in Turkey as in other developing countries, and plays a crucial role in its development. Monitoring the economic situation is very important to be able to take action and have an idea of the trade trends.

Table 1. Agricultural GDP and productions of Turkey, 2009–2016

Years	Growing rate (%)	Rate in total GDP (%)	Agricultural GDP (thousand USD)	Total GDP (thousand USD)
2009	9.1	8.1	52 592 510	646 894 531
2010	28.9	9.0	69 714 325	772 366 615
2011	9.7	8.2	68 491 565	831 691 448
2012	6.0	7.8	67 536 064	871 122 993
2013	0.0	6.7	63 914 163	950.350 602
2014	10.7	6.6	61 604 432	934 855 430
2015	19.8	6.9	59 499 609	861 879 256
2016	−0.1	6.2	53 414 802	862 744 000

Source: Republic of Turkey Ministry of Agriculture and Forestry Directorate of Strategy Development (2020)

The Turkish agricultural sector is growing and it produces 34.4 million tons of cereal crops, 30 million tons of vegetables, 22.2 million tons of fruit, 2.1 million tons of poultry and 1.1 million tons of red meat per year (Presidency of Republic of the Turkey Investment Office 2020). The country derives revenue of about USD 54 billion from this production (Table 1; Republic of Turkey Ministry of Agriculture and Forestry Directorate of Strategy Development 2020).

Dried products have become the most crucial product for sustainable agriculture and to support rural development. Dried products have a higher price in local and international markets and provide income for a large number of farmers and exporters. According to the Turkish Statistical Institute (TUIK) data, dried fruit and product exports reached about USD 1.311 billion (Table 2). In addition, Turkey is the major player in the dried fruit and vegetables sector, especially in apricot and fig production. Leadership in the production of raisins has changed hands between the USA and Turkey over the years. In case of Turkey, the annual exports of dried raisins are at 270 000 tons; of apricots at 145 000 tons; of dried figs at 72 000 tons; and nearly 25% of global dried fruit exports come from Turkey (Trade Ministry of Turkish Republic 2020).

Turkey exports the dried fruit and vegetables mostly to the European countries and has higher competitiveness there (Arisoy et al. 2014). However, any increase of exports to European markets implies an increase in competition.

On the other hand, Turkey has some competitive advantages over other nations such as being a unique country for agricultural production (except for tropical products), low labour cost and raw material prices, and proximity to European markets. Nevertheless, it also has some disadvantages like high tax rates, higher fuel and electricity prices (mostly dependent on local currency and international fuel prices), and low investments in the dried sector.

Earlier research investigated the comparative and competitive advantages (Balassa 1965); the agrifood sector in Hungary (Fertö and Hubbard 2003); Turkish fruits (Hatirli et al. 2004); the Canadian agricultural sector (Sarker and Ratnasena 2014); and the dairy sector (Couillard and Turkina 2015).

Furthermore, the comparative and competitive advantages of Turkey and other countries in the sector were explored in detail by national and international research such as Balassa (1965, 1977, 1986), Kojima (1970), Hillman (1980), Bowen (1983), Richardson and Zhang (1999), Sahinli (2011, 2013, 2014), Altuntaş and Akpolat (2013) and Ertemli and Demirbaş (2015).

The main objective of this study is to analyze the export performance of dried apples, prunes, apricots,

Table 2. Dried fruit and vegetable export by the year of 2017–2018

Sectors	Export (March 1–February 28)			
	2017 (billion USD)	2018 (billion USD)	percentage (%)	rate (%)
Dried fruit and products	1 287 822	1 311 142	1.81	0.82
Agricultural sector	20 360 045	21 646 280	6.32	13.61
Turkish total export	143 092 273	159 027 107	11.14	100.00

Source: Istanbul Exporters Association (2020)

figs, grapes, and other cut vegetables for Turkey and selected countries by using comparative and competitive advantage indices.

MATERIAL AND METHODS

This study included an annual time series of dried apples, prunes, apricots, figs, grapes, and other cut vegetables for 2007 to 2017. When calculating the comparative and competitive advantages, the exports and imports data was collected from Trade Statistics For International Business Development (2020).

In the relevant literature, many indicators were used to analyze the competitive and comparative advantages. In this study, Revealed Comparative Advantage (*RCA*), Relative Export Advantage (*RXA*), Relative Import Advantage (*RMA*), Relative Trade Advantage (*RTA*) and Relative Competitiveness (*RC*) indices were subjected to collected data.

Revealed Comparative Advantage (*RCA*). Balassa's (1965) measure of relative export performance by country and industry/commodity was defined as a country's share of world exports of a commodity divided by its share of total world exports. The index for country *i* and commodity *j* was calculated as follows:

$$RCA_{ij} = (X_{ij}/X_{wj})/(X_i/X_w) \tag{1}$$

where: X_{ij} – i^{th} country's export of commodity *i*; X_{wj} – world exports of commodity *j*; X_i – total exports of country *i*; X_w – total world exports.

The *RCA* index measures a country's exports of a commodity relative to its total exports and compares them to the other selected countries' export performance. Indicative values of RCA index vary between 0 and +∞. An index value greater than 1 denotes the product in which the country is relatively more competitive.

Relative Trade Advantage (*RTA*). The Relative Trade Advantage index was first used by Scott and Volrath (1992). The *RTA* index demonstrates the net trade advantage or disadvantage. *RTA* considers the Relative Export Advantage (*REA*) and Relative Import Advantage (*RIA*). Therefore, the *RTA* index is a more comprehensive measure of competitiveness and expressed as (Sassi 2003):

$$RTA_{ij} = RXA_{ij} - RMP_{ij} \tag{2}$$

where: RMP_{ij} – relative import penetration index.

Indicative values of *RTA* index can be above or below zero. A positive value shows a net competitive advan-

tage and a negative value shows a net competitive disadvantage in agricultural trade.

Relative Export Advantage (*RXA*). The Relative Export Advantage is calculated as the *RCA* of the country groups over a large number of manufactured industries. In the *RXA*, *X* refers to exports, subscripts *i* and *n* denote the product and categories and *j* and *t* the countries (Hatirli et al. 2004).

$$RXA_{ij} = (X_{ij}/X_{it})/(X_{nj}/X_{nt}) \tag{3}$$

A value greater than 1 means that the country has a competitive advantage and a value lower than 1 means that the country has a competitive disadvantage.

Relative Import Advantage (*RMA*). The Relative Import Advantage is calculated the same way as *RXA*, and here, *M* refers to imports, subscripts *i* and *n* denote the product and categories and *j* and *t* the countries:

$$RMA_{ij} = (M_{ij}/M_{it})/(M_{nj}/M_{nt}) \tag{4}$$

A value greater than 1 means that the country has a competitive disadvantage, and a value lower than 1 denotes that the country has a competitive advantage (Hambalkova 2006).

Relative Competitiveness (*RC*). The Relative Competitive index is shown as adopted by Barca and Gürpinar (2007). An index value greater than 0 indicates that the country has a comparative advantage in the relevant sector. On the contrary, the index value lower than 0 indicates that it has a comparative disadvantage (Altintas and Akpolat 2013).

$$RC_{ij} = Ln(RXA_{ij}) - Ln(RMA_{ij}) \tag{4}$$

where: *j* – the country; *i* – goods.

RESULTS AND DISCUSSION

In this study, the agricultural food data in the 2007 to 2017 period was subjected to the computation of *RCA*, *RXA*, *RMA*, *RTA*, and *RC* indices. These indices were calculated for the dried sector of selected countries that dominate the world trade and production.

The *RCA* analysis results are shown in Table 3. As seen in the table, Turkey, Chile, and Uzbekistan have higher *RCA* index values. On the contrary, India, Spain, Germany, and the Netherlands have lower values. Iran and Argentina are close to the mean value.

According to the 2007 data, the *RCA* index varied in the range of 0.09 to 28.8. By 2015, Uzbekistan

Table 3. Revealed Comparative Advantage (*RCA*) index value of selected countries

Countries	RCA											mean value	percentage (%)
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
China	2.13	1.65	1.55	1.91	2.16	1.44	1.19	0.99	1.01	1.50	1.64	1.560	−23.1
Turkey	28.58	27.56	28.38	29.53	29.01	26.70	28.24	28.11	25.27	22.12	21.70	26.837	−24.1
USA	1.74	1.89	1.76	1.69	1.75	1.77	1.79	1.74	1.56	1.39	1.31	1.671	−24.6
Chile	12.75	18.60	14.44	14.24	13.73	17.45	19.00	22.62	21.12	15.70	15.34	16.817	20.3
Germany	0.46	0.49	0.43	0.44	0.48	0.54	0.59	0.58	0.52	0.48	0.52	0.502	13.2
Iran	8.77	5.92	11.06	10.26	8.70	11.91	14.08	13.12	16.90	12.09	6.01	10.803	−31.5
Netherlands	0.71	0.69	0.75	0.69	0.82	0.92	1.02	1.02	1.02	1.16	1.22	0.911	72.7
South Africa	3.67	3.39	3.02	3.65	1.60	2.93	3.59	3.83	5.25	4.59	4.20	3.611	14.6
France	0.97	0.82	0.72	0.62	0.64	0.73	0.80	0.79	0.72	0.60	0.68	0.736	−30.2
Uzbekistan	17.83	15.49	20.11	20.90	26.35	27.58	14.49	31.36	50.50	44.25	39.45	28.030	121.3
Argentina	7.71	6.43	5.77	5.18	5.55	5.72	7.98	5.02	7.27	6.30	5.76	6.244	−25.3
Spain	0.87	0.76	0.61	0.60	0.69	0.65	0.77	0.79	0.78	0.67	0.80	0.726	−7.7
India	0.09	0.20	0.54	0.17	0.24	0.83	0.69	0.44	0.55	0.91	0.83	0.498	785.2
Mean value	6.64	6.45	6.86	6.91	7.05	7.63	7.25	8.49	10.19	8.60	7.65	7.611	15.3

Source: Own calculations based on Trade Statistics for International Business Development (2020)

had a higher *RCA* index value with 50.50. Uzbekistan made significant developments after 2014 and reached a higher value of the *RCA* index. During the investigated period of 2007 to 2017, Uzbekistan and Turkey had higher comparative and competitive advantages than other countries. On the other hand, Turkish *RCA* index declined after 2011. Turkish *RTA* index values (Table 4)

showed the same trend with the *RCA* index and hit the higher values in 2011. However, the *RTA* index declined after 2011 as well. Nevertheless, Turkey still has a higher comparative advantage index than the selected countries. The highest rate for improvement of its advantage had India which improved its *RCA* index by 785.55%.

Table 4. Relative Trade Advantage (*RTA*) index value of selected countries

Countries	RTA											mean value	percentage (%)
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
China	2.29	1.68	1.57	2.07	2.40	1.41	1.12	0.90	0.90	1.49	1.70	1.59	−25.8
Turkey	36.36	35.25	36.68	37.73	36.68	33.90	36.22	36.35	31.91	27.15	26.44	34.06	−27.3
USA	1.34	1.56	1.37	1.31	1.35	1.39	1.40	1.32	1.10	0.84	0.76	1.25	−43.4
Chile	13.04	19.43	14.96	14.68	14.21	18.20	19.84	24.41	22.06	15.88	15.57	17.48	19.4
Germany	−1.20	−1.15	−1.09	−1.16	−1.22	−1.19	−1.14	−1.18	−1.20	−1.10	−1.05	−1.15	−12.7
Iran	9.18	6.02	11.69	10.90	9.22	12.97	15.10	13.97	18.03	12.89	6.21	11.47	−32.3
Netherlands	−1.35	−1.14	−1.19	−1.22	−1.27	−1.29	−1.31	−1.44	−1.16	−1.12	−1.00	−1.23	−25.9
South Africa	3.24	3.09	2.47	3.10	1.10	2.44	3.13	3.37	4.78	3.69	3.30	3.07	1.7
France	−0.23	−0.53	−0.49	−0.62	−0.57	−0.53	−0.45	−0.52	−0.58	−0.69	−0.61	−0.53	166.8
Uzbekistan	17.93	15.63	20.42	21.21	26.80	28.01	14.54	31.95	52.17	45.78	40.64	28.64	126.7
Argentina	7.34	6.19	5.47	4.62	5.33	5.46	7.91	4.69	7.04	5.89	5.18	5.92	−29.3
Spain	0.15	0.02	−0.27	−0.35	−0.29	−0.32	−0.32	−0.37	−0.36	−0.55	−0.31	−0.27	−297.2
India	−0.86	−0.57	−0.20	−0.50	−0.26	0.54	−0.26	−0.58	−0.75	−0.23	−0.81	−0.41	−5.6
Mean value	7.99	7.82	8.35	8.42	8.55	9.16	8.76	10.35	12.28	10.06	−	9.17	25.9

Source: Own calculations based on Trade Statistics for International Business Development (2020)

Table 5. Relative Export Advantage (*RXA*) index value of selected countries

Countries	RXA											mean value	percentage (%)
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
China	2.39	1.76	1.64	2.14	2.49	1.53	1.22	0.98	1.01	1.63	1.81	1.69	−24.4
Turkey	36.70	35.64	37.11	38.04	37.05	34.24	36.52	36.70	32.40	27.55	26.85	34.44	−26.8
USA	1.87	2.06	1.90	1.80	1.87	1.90	1.93	1.87	1.66	1.45	1.35	1.79	−27.5
Chile	13.59	20.12	15.44	15.26	14.62	18.85	20.60	24.90	22.99	16.72	16.34	18.13	20.3
Germany	0.43	0.47	0.41	0.42	0.46	0.52	0.57	0.56	0.50	0.46	0.49	0.48	14.8
Iran	9.23	6.13	11.85	11.03	9.26	12.97	15.10	13.97	18.03	12.89	6.21	11.52	−32.7
Netherlands	0.70	0.69	0.74	0.68	0.82	0.91	1.02	1.02	1.02	1.17	1.23	0.91	75.7
South Africa	3.72	3.43	3.04	3.71	1.61	2.96	3.64	3.88	5.36	4.67	4.28	3.67	15.1
France	0.97	0.82	0.71	0.61	0.63	0.73	0.79	0.79	0.72	0.59	0.67	0.73	−30.8
Uzbekistan	18.05	15.68	20.42	21.22	26.81	28.04	14.63	31.99	52.26	45.85	40.71	28.70	125.5
Argentina	7.94	6.59	5.91	5.29	5.68	5.85	8.23	5.10	7.45	6.44	5.86	6.39	−26.2
Spain	0.86	0.76	0.60	0.60	0.68	0.65	0.77	0.79	0.77	0.67	0.80	0.72	−7.8
India	0.09	0.20	0.53	0.17	0.23	0.83	0.68	0.44	0.55	0.91	0.83	0.50	791.2
Mean value	7.43	7.26	7.72	7.77	7.86	8.46	8.13	9.46	11.13	9.31	–	8.45	−100.0

Source: Own calculations based on Trade Statistics for International Business Development (2020)

Uzbekistan had the same trend for *RTA* index as for its *RCA* index. The country steadily improved its *RTA*. From Table 1 it can also be derived that Chile, Germany, the Netherlands, South Africa, India, and Uzbekistan improved their *RCA* positively. The highest rate of increase of the *RCA* value is that of India, which improved its *RCA* index by 785.55%. Uzbekistan had the second highest increase in *RCA* index, improving it by 121.3% during the period.

As for the *RTA* index, Turkey had a value of 36.36 in 2007 and decreased its relative competitive advantage during that period by 27.3%. However, Turkey had

Table 6. Relative Import Advantage (*RMA*) index value of selected countries

Countries	RMA											mean value	percentage (%)
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017		
China	0.10	0.08	0.08	0.07	0.10	0.11	0.10	0.09	0.11	0.13	0.11	0.10	7.3
Turkey	0.35	0.39	0.43	0.31	0.37	0.34	0.30	0.34	0.49	0.40	0.41	0.38	19.0
USA	0.53	0.50	0.52	0.49	0.52	0.51	0.53	0.55	0.56	0.60	0.60	0.54	12.7
Chile	0.54	0.69	0.48	0.57	0.41	0.65	0.76	0.49	0.93	0.85	0.77	0.65	40.6
Germany	1.63	1.61	1.50	1.58	1.68	1.71	1.71	1.74	1.70	1.56	1.54	1.63	−5.5
Iran	0.05	0.11	0.17	0.13	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.05	−97.2
Netherlands	2.05	1.83	1.94	1.90	2.09	2.20	2.33	2.46	2.18	2.29	2.23	2.14	8.7
South Africa	0.48	0.34	0.57	0.61	0.51	0.52	0.51	0.51	0.58	0.98	0.98	0.60	106.3
France	1.20	1.34	1.20	1.23	1.20	1.26	1.24	1.31	1.30	1.28	1.28	1.26	7.0
Uzbekistan	0.12	0.04	0.00	0.01	0.00	0.03	0.09	0.04	0.08	0.07	0.06	0.05	−50.1
Argentina	0.60	0.40	0.43	0.67	0.34	0.39	0.32	0.41	0.41	0.54	0.68	0.47	12.8
Spain	0.71	0.74	0.87	0.95	0.98	0.96	1.08	1.16	1.13	1.21	1.10	0.99	55.3
India	0.95	0.77	0.73	0.67	0.49	0.29	0.95	1.02	1.29	1.14	1.64	0.90	72.0
Mean value	0.72	0.68	0.69	0.71	0.67	0.69	0.76	0.78	0.83	0.85	–	0.74	−100.0

Source: Own calculations based on Trade Statistics for International Business Development (2020)
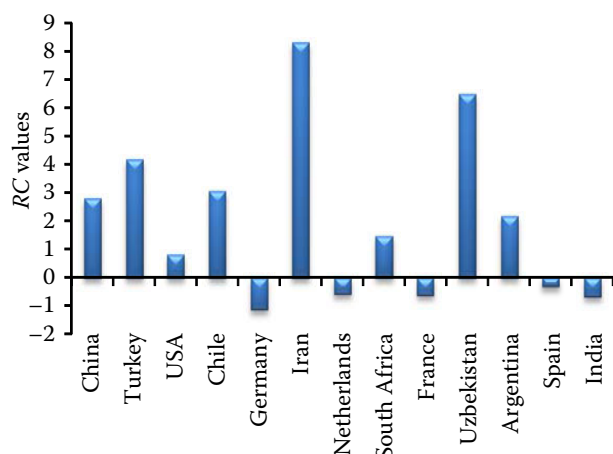
Figure 1. Relative Competitiveness (*RC*) index values of selected countries

Source: Own calculations based on Trade Statistics for International Business Development (2020)

had a significant advantage in terms of *RTA*. As can be seen in Table 4, Germany, the Netherlands, France and India had a disadvantage in terms of *RTA*. France had a significant disadvantage in terms of *RTA*, and it reduced its index by 166.8% during the period.

Turkey also had positive *RXA* (Table 5) and its situation showed the same trend as that of *RCA* and *RTA*. Turkish *RMA*, however, showed a trend different from other indices. By 2015, Turkey increased its *RMA* values by 19% (Table 6). Higher *RMA* increment was that of South Africa in positive terms and Uzbekistan had a negative increment in terms of *RMA*.

Competitive advantage is the leverage that a country has over its competitors. As can be seen in Figure 1, Germany, the Netherlands, Spain, India and France did not have a relative competitive advantage (*RC*). On the contrary, China, Turkey, USA, Chile, Iran, South Africa, Uzbekistan and Argentina did have a relative competitive advantage. In terms of *RC*, all the countries decreased their competitiveness during the period, except for Uzbekistan which increased it by 30.3%.

It is well-known that global economic crises affect the entire world and that Turkish economy was affected by the 2008 economic crisis (Sahinli 2014). Its effect on the Turkish dried sector and its competitiveness was seen as a small drop in 2009. On the contrary in 2010, central budget investments increased and its effect on competitiveness of dried sector was observed. The world economic crisis of 2008 and the Gezi revolt of 2013 affected the Turkish economy and its relative competitiveness. Figure 2 illustrates that after these two crises, Turkey lost its competitiveness relatively.
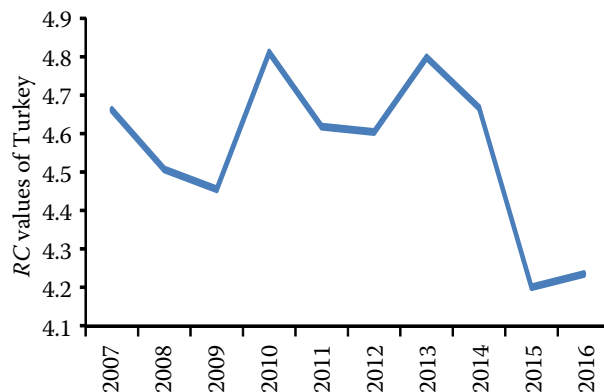

Figure 2. Relative Competitiveness (*RC*) index values of Turkey during the period of 2007 to 2017

Source: Own calculations based on Trade Statistics for International Business Development (2020)

However, it still had higher competitiveness and protected its situation.

In addition to these findings, Turkish government must make more efforts to improve competitiveness of Turkish dried sector by streamlining the exportation process and reducing the energy prices for producers as mentioned earlier by Ertemli and Demirbaş (2015).

CONCLUSION

The world agricultural fruit and vegetables sector is growing more and more yearly. Germany, Italy, the Netherlands, France, and Spain are the major players in Europe. Turkey and China are sharing the majority in Asia. USA and Chile supply nearly 21% of world trade in dried sector. Uzbekistan is a new player in the sector and the new player and developments make it harder to achieve and maintain competitiveness. Therefore the countries have to be aware of the market demands and fresh product. Some countries like Turkey also have natural advantages.

As the data shows, South Africa has higher *RCA*, *RTA* and *RXA* indices as well. The country has some advantages with its sunny climate and low labour costs. On the contrary, its *RMA* is lower than 1 and that explains its relative import advantage.

Iran also has higher indices in dried sector and its *RCA* value reached 14.08 in 2013; nevertheless it lost its comparative advantage after 2016, the value dropping to 6.01. The same tendencies can be seen for its *RTA* and *RXA* indices. However, the country has an advantageous *RMA* value.

The data shows that Germany, France, Spain and India have lower *RCA* values which reveal their disadvantages.

Turkey aims to increase the exports of its dried products to 25% of agricultural GDP. According to the current data, this value for dried products exports is only about 12%. The Turkish economy is still under development and is fragile. This situation slows down the country to reach its goal for 2023.

However, Turkish comparative advantages and competitiveness are still at a higher level. Turkey needs to boost its investment into the dried sector. This achievement needs both the state and firms to provide how-know to producers and the state should also provide investment incentives. Moreover, the state should provide low electric prices, low fuel prices, direct incentives, reduced taxes and reduced bureaucratic burden.

Turkey exports dried fruits and vegetables generally to the EU markets, where the quality control systems are involved. This type of requirement decreases the exports of the dried sector. Nowadays, most of the dried fruits exporter companies have received the ISO and HACCP system certificates in Turkey.

Another issue is that of technological investments that supply better quality products for the market. Dried fruits and their branding are also important to reach global and national markets. This point poses some difficulties because of the low value of Turkish currency for buying better technology dryers and machines which would result in better product quality and variety.

During the last decade, consumer demand on products has changed and new types of products are in the markets. To catch up with market changes, Turkey needs more investments and the state and the firms should provide knowledge transfer to producers.

As a result, Turkey still has comparative and competitive advantages in the dried sector. However, the country should do more things to its goal, such as improving existing infrastructure and productivity.

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