

Why the new orange juice consumption model favors global trade and growth in orange production

New orange
juice
consumption
model

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Abstract

Purpose – The purpose of this paper is to analyze international orange trade as different types of orange juice seem to obtain the favor of newer food consumption patterns as opposed to fresh oranges. In addition, the authors will outline market tendencies that could be useful to stakeholders interested in any way in the sector.

Design/methodology/approach – This document uses the Lafay index (LFI) in order to evaluate the intra-sectoral trade specialization; however, the social network analysis (SNA) approach is used to connect the international trade relations and to refine, classify and prioritize the countries having a central role in the orange juice world trade network. For both indexes, UNCOMTRADE has been used.

Findings – The findings show that the growing orange juice trade is the leading global growth factor as opposed to the sale of fresh oranges. It appears that major trade revenues come from orange juice concentrate (Frozen Concentrated Orange Juice (FCOJ)). Business takes place mostly in Europe.

Originality/value – This study shows for the first time that the current orange juice export competitiveness is crucial to the long-term survival of the orange sector. This study valuably contributes to the less known literature regarding FCOJ and Not From Concentrate orange juice trade relevance.

Keywords LFI – competitive advantage, Orange juices, SNA – relationship, Strategic international trade

Paper type Research paper

1. Introduction

The fruit juice sector is currently showing a positive and dynamic growth owing to a change in lifestyle and the fact that consumers are becoming more and more aware about potential health benefit of the use of fruit beverages (Gil-Izquierdo *et al.*, 2002; Licciardello *et al.*, 2018); hence, the consumer tendency to prefer new and healthy products. There is a variety of functional benefits showing that fruit juices are part of the so-called new-age beverages. A similar observation has been made in the fruit drinks sector (Heng *et al.*, 2018); it is possible that the need to save time together with healthy diet choices has encouraged consumers to use ready-made orange juice (Marano-Marcolini and Torres-Ruiz, 2017). This social and cultural phenomenon intensified in the 1990s including the orange sector. Both production and use of orange juice have grown at the same time in the following years. Increasing population growth and per person usage eased the transition from fresh oranges to orange juice and/or orange-based beverages (Liu *et al.*, 2012; Scuderi and D'Amico, 2015). The contribution of transformed oranges to the market has significantly influenced world orange production in recent years (USDA, 2016). The world fresh orange production has increased by 10m tonnes

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in the last 20 years to a total of 70m tonnes, with an increasing tendency for the future. Based on FAOSTAT data, this tendency appears to be defined by the orange culture land extending in areas generally not dedicated for it, such as China, Egypt, India, Indonesia and Turkey, while the production in countries with a long orange cultivation tradition, such as Italy, Mexico, South Africa and Spain, the production has not varied and has slightly increased. A much more evident decrease has occurred in major producers such as Brazil and Florida and to a lesser degree in important producing countries such as Morocco, Greece and Argentina. Figure 1(a, b and c) shows the evolutionary trend production of orange fruit by geographical area. The processing sector in this ever-changing dynamic has a major role in the production of orange juices (Dhamodharan *et al.*, 2016). The orange juices analyzed in this document are “Frozen Concentrated Orange Juice” (FCOJ) “Not From Concentrate” (NFC) and “straight-from-the-grove.” FCOJ and NFC are two competing types of raw material (semi-finished) used in the production of fruit beverages. The trading features are experiencing the rising success of FCOJ and the decline of NFC in international markets (Figure 2). Vital factors are the progressive widening of consumer markets, according to free trade barriers since WTO, and the deep changes in the distribution sector and in consumption patterns. However, many orange juice business issues are still open; few have been tackled by academics literature; to our knowledge, only recently a study has been made assessing the relationship between commerce and the juice chain orange in Brazil (Santos *et al.*, 2013). This document evaluates the latest in FCOJ and NFC in the international trade structure showing the trade specialization areas and the main competing countries regarding import/export trade relations and their impact on the orange sector. The hope is to divulge what is known about the most recent economics and trade scenario from which we can deduce useful information for anyone interested in the world orange sector progress about semi-finished orange juice products.

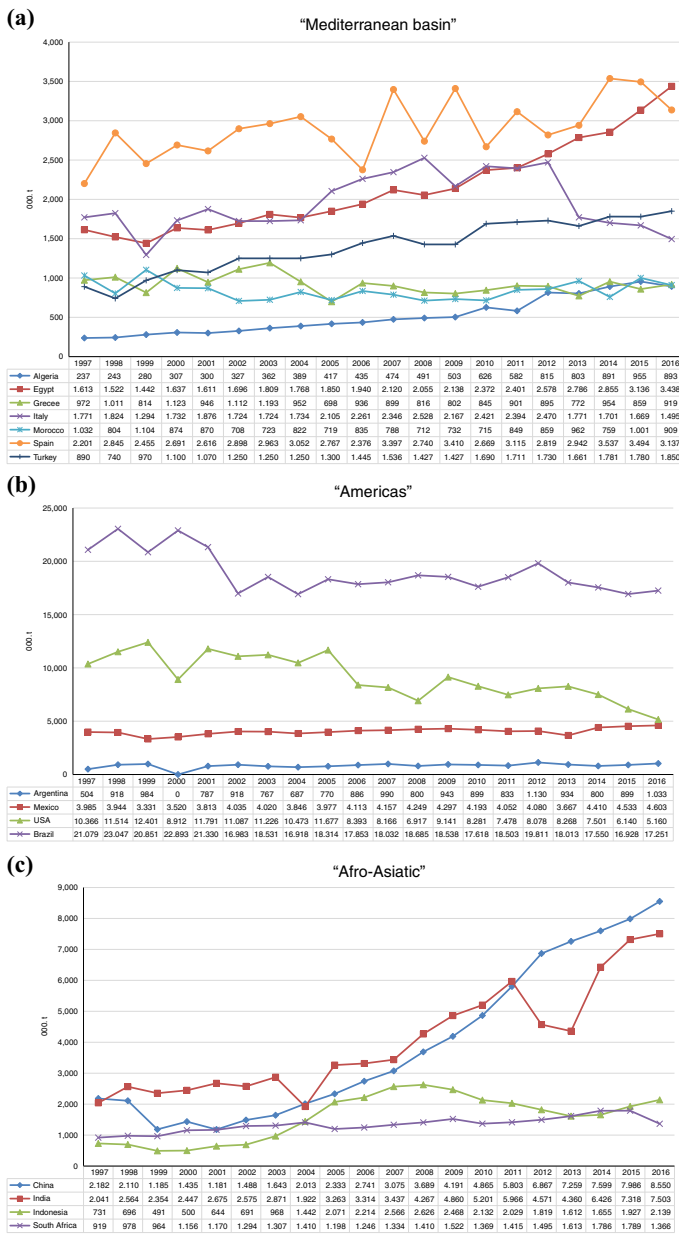
2. Methodology

This document’s methodology has been structured to analyze trends and performance of orange juices international trade in two steps. The first step targets the trade flow trends referred to the main countries involved (compared benefits) impacting their specialist production role. Second, a network pattern has been developed regarding orange juices world trade determining the connection among all countries involved. As for the first step, we have used Gerard Lafay’s index (LFI), which is highly reliable when considering import and export two-way flows. This is because the world’s bilateral flows of orange juices are increasing; therefore, we chose not to restrict the analysis only to exports (Balogh and Jámor, 2017). When analyzing import and export trends individually, already giving valuable commercial trends does not adequately assess the comparative benefits of a specific country, Lafay’s index solves this (Boffa *et al.*, 2009). The Lafay index compares the normalized balance of a country’s net exports with the normalized balance of the aggregate net exports of the countries (15 countries with over 10,000 tons and 10 countries with less than 10,000 tons). In particular, in the expression shown below, the index i indicates a specific country; the variables x and m represent the monetary value of the exports and imports, respectively, of the products from sector j ; while Σ_j is the sum of the imports and exports for all countries.

Following is the formula:

$$IS_j = \left[\frac{x_j^i - m_j^i}{x_j^i + m_j^i} \frac{\sum_j x_j^i - \sum_j m_j^i}{\sum_j x_j^i + \sum_j m_j^i} \right] \times \left[\frac{x_j^i - m_j^i}{\sum_j x_j^i + \sum_j m_j^i} \right] \times 100.$$

The Lafay index takes $-$, 0 and $+$ values. The results of the index are as follows: a positive value indicates that the country is relatively specialized; a negative value indicates that the country is not specialized; 0 indicates that the country’s exports are equal to its imports. In the second phase of this study, we have referred to the social network analysis (SNA). This is a reason



Source: FAOSTAT (Database: Crops)

Figure 1. Production trend of orange fruits from 1997 to 2016

for resistance, a commercial system is not only strictly contractual but is based on loyalty and a good reputation shared between partner countries (Aichele and Heiland, 2018) aimed at minimizing potential exposures to economic, cultural and social activities of individual countries. Due to the fact that producers and traders interactions favor superior quality products

(Frostling-Henningsson *et al.*, 2014) and exchanges between partnering countries allow technological innovation and knowledge transfer (Ahmedi *et al.*, 2017; Aller *et al.*, 2015), this system is patterned in a network where countries (already emerged or emerging producers) by nodes and exchange flows by links (Bhattacharya *et al.*, 2008; Pappalardo, Allegra and Pecorino, 2014). In this network, the ties represent trade relations evaluating the intensity, frequency, symmetry and reciprocity degree (Pappalardo, Allegra and Zarbà, 2014). Therefore, the position of the node and its role are crucial as compared to the rest of the system (other countries). Since the network nodes group up in similarity based on an exchange pattern (Wu and Hasan, 2013), the link structure (structural equivalence) sets the position among nodes and the interaction of the roles (Scuderi and Sturiale, 2014). The structure of a graph is represented by a matrix called square matrix whose elements are the countries placed on both lines and columns; lines and columns are connected by the export amount in the same number of rows and columns. In order to build the matrix, we have established size classes in Excel sheets, namely with numbers between 0 and 7 for the two types of orange juice which means:

0	1	2	3	4	5	6	7
10–00	101–1,000	1,001–2,500	2,501–5,000	5,001–10,000	10,001–50,000	50,001–100,000	> 100,000

When processing we referred to the UNICET software which is able to show all findings in a graph form. The program in a jpeg format determines the nodes and links layout. A number of variously connected commercial partners (centrality degree) accompany every node (Scott, 2013). Extremely close countries (closeness) have a higher potential to interact with partner countries with reduced geodetic distance among pairs of countries. Countries featuring multiple hubs show an appealing disposition for near or distant countries (farness). HS200911 and HS200919 matrices were run processed through the UCINET software to show the graphical representation of the networks; this produced the corresponding country values for the density and cohesion (out farness) and degree of centrality (out closeness). We used statistics UN Comtrade to ascertain the quantities of the exports and imports of orange fruit crops and orange juice in the world (Allegra *et al.*, 2012). UN Comtrade uses a six-digit code harmonized system (HS) of names and numbers. For NFC orange juice, it is “HS200911 Orange Juice-Frozen” and for FCOJ it is “HS200919 Orange Juice Other.”

3. Results

Tables I and II show the evolutionary trends of fresh orange and semi-finished orange juice exports. In the period 1997–2016, the share of world production of fresh oranges in

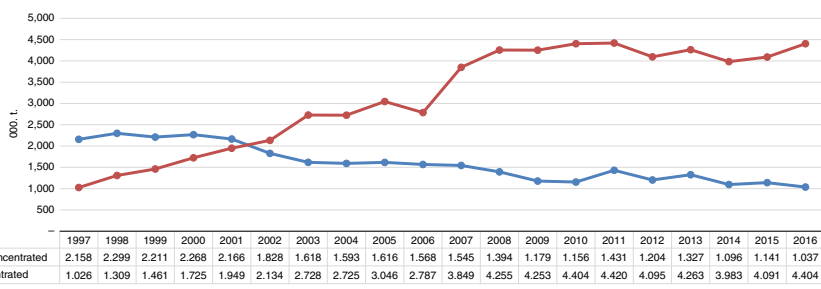


Figure 2.
Evolutionary path for orange juices exports by the world

Source: UN Comtrade (Database: Commodity List)

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Geographical areas and main countries	1997–2000	2001–2004	2005–2008	2009–2012	2013–2016
Mediterranean basin					
Algeria		1	1	0	7
Egypt	–	–	163,838	822,910	912,476
Greece	294,756	300,787	221,972	352,899	366,176
Italy	116,457	116,404	112,771	126,971	129,520
Morocco	–	178,650	267,283	173,435	107,311
Spain	1,380,424	1,483,001	1,320,755	1,486,149	1,723,149
Turkey	82,544	160,520	194,294	299,452	339,233
Americans					
Argentina	78,713	101,418	175,016	127,618	72,656
Brazil	83,927	84,536	42,200	29,941	24,481
Mexico	21,329	15,199	19,736	21,378	45,838
USA	515,691	578,038	515,609	658,748	669,215
Afro-Asiatic					
China	7,246	16,269	80,502	131,733	77,796
India	19,105	35,254	31,597	20,840	23,816
Indonesia	281	486	205	6	10
South Africa	97,314	686,143	1,053,840	1,043,281	1,134,017
Mediterranean basin	1,874,181	2,239,361	2,280,914	3,261,816	3,577,873
Americans	699,659	779,192	752,561	837,684	812,190
Afro-Asiatic	123,945	738,152	1,166,144	1,195,860	1,235,639
Others	1,065,881	2,042,423	1,133,617	1,279,159	1,321,835
World	3,763,666	5,799,128	5,333,236	6,574,510	6,947,537

Source: UNCOMTRADE (Database: Commodity list)

Table I.
Fresh oranges:
exports (tonnes)
of the world from
1997 to 2016
(four-year averages)

international trade has increased from 6 to 10 percent, that is, from 3.8m tons in the period 1997–2000 to 7.0m tons in the period 2013–2016. In the same period, around the world, the volume of exports of frozen concentrated juice (HS200919) increased (+200 percent) from 1.4 to 4.2m tons, while the volume of exports of refrigerated juice (HS200911) decreased (–45 percent) from 2.2 to 1.2m tons. Some technological characteristics of orange juices restrain industrial development initiatives in the non-concentrate refrigerated (Corrêa De Souza *et al.*, 2004), because a shelf life maintains the product's original characteristics, both nutritional and sensory, within a rather limited time span, together with the cost of supporting the market and the logistics costs. America's area has been determining the highest traffic currents of orange juices, with around 89 percent of world exports of non-concentrated orange juices (HS200911) and with 87 percent of concentrated HS200919.

Smaller quantities, very different from those of the Americas, represent the Mediterranean basin. Although in the 20 years in question, both categories of juices have increased in absolute value, the share of participation in global exports has increased for HS200911 from 2 to 9 percent, while it decreased from 11 to 6 percent for HS200919. The smaller distance Mediterranean basin with the large market of juices in the world, countries of Europe, favors the business of non-concentrated juices HS200911. Afro-Asian countries participate in orange juice exports in a very limited extent. On the other hand, chilled juice is a lesser beneficiary in the comparison between juices due to the greater difficulties in transfers (storage times, higher transport costs), especially if the transfers are intercontinental (Carter *et al.*, 2016). The Lafay index (LFI) highlights the levels of specialization of countries, and we have divided these between positive areas and negative areas in Tables III and IV, to the semi-finished orange juice categories HS200911 and HS200919 regarding the time lapse between 2009 and 2016. Changes in the specialization trade index seem to indicate a shift in the contribution in the aforementioned semi-finished orange juice categories toward foreign consumption, far from the mature specialization and toward the developing specialization. Do these orange juice

Table II.
Orange juices: exports
(tonnes) of the world
from 1997 to 2016
(four-year averages)

Geographical areas and main countries	HS200911				HS200919					
	1997-2000	2001-2004	2005-2008	2009-2012	2013-2016	1997-2000	2001-2004	2005-2008	2009-2012	2013-2016
Mediterranean basin										
Algeria	-	-	-	-	-	13	34	86	345	1,439
Egypt	-	-	164	1,630	9,966	-	-	205	1,782	796
Greece	2,358	1,480	1,974	5,719	6,904	5,326	4,716	4,952	3,582	7,134
Italy	22,857	48,821	52,651	49,643	52,967	8,912	8,428	9,139	8,035	6,696
Morocco	-	1,092	332	416	568	-	2,477	529	2,274	2,673
Spain	16,654	27,496	44,080	44,598	31,213	143,765	217,534	205,793	185,934	217,179
Turkey	638	259	228	379	2,105	879	4,169	5,713	4,346	5,442
Americans										
Argentina	1,596	3,904	7,807	6,836	3,499	1,575	389	914	356	327
Brazil	1,200,010	1,071,627	946,742	490,890	546,385	19,076	391,249	970,698	1,496,204	1,546,409
Mexico	52,365	28,820	51,597	78,771	125,211	18,354	37,084	15,535	17,998	37,726
USA	345,641	316,028	251,174	348,760	182,994	254,808	113,096	174,522	351,401	317,812
Afro-Asiatic										
China	1,271	2,451	2,047	1,729	2,824	709	728	6,317	14,910	1,745
India	-	86	93	222	52	26	100	171	74	203
Indonesia	48	135	28	97	14	107	158	175	531	1,041
South Africa	2,619	8,329	4,676	16,431	5,313	615	4,300	9,202	33,210	37,224
Mediterranean basin	42,507	79,148	99,429	102,385	103,722	158,895	237,358	226,417	206,297	241,359
Americans	1,599,611	1,420,379	1,257,320	925,256	858,089	293,812	541,817	1,161,670	1,865,959	1,902,274
Afro-Asiatic	3,938	11,001	6,844	18,478	8,201	1,458	5,286	15,864	48,724	40,213
Others	587,993	290,596	167,053	196,056	180,156	926,033	1,599,469	2,080,192	2,171,873	2,001,417
World	2,234,049	1,801,124	1,530,646	1,242,175	1,150,168	1,380,198	2,383,930	3,484,143	4,292,853	4,185,263

Source: UNCOMTRADE (Database: Commodity list)

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Countries	2009	2010	2011	2012	2013	2014	2015	2016
<i>HS200911</i>								
Countries exceeding 10,000 tonnes								
Positive area								
Argentina	0.30	0.11	0.19	0.25	0.11	-0.08	0.02	-0.04
Brazil	27.76	22.31	18.35	25.14	26.38	21.32	27.67	28.93
Egypt	0.02	0.04	0.07	0.15	0.54	1.03	0.06	0.07
Italy	1.08	2.26	1.50	2.58	2.01	1.40	1.93	2.82
Mexico	3.57	2.85	5.05	3.07	4.94	6.25	5.48	6.99
South Africa	2.19	0.33	0.25	0.32	0.32	0.29	0.16	0.20
Spain	1.09	0.34	0.43	0.73	1.38	-1.06	-0.13	-1.14
Negative area								
Algeria	-0.14	-0.24	-0.26	-0.38	-0.22	-0.53	-0.24	-0.26
China	-2.17	-3.99	-4.11	-3.29	-2.69	-6.42	-2.70	-3.21
Greece	-0.17	-0.46	-0.28	-0.13	-0.05	-0.41	0.15	0.16
India	-0.08	-0.04	-0.14	-0.23	-0.18	-0.30	-0.30	-0.35
Indonesia	-0.11	-0.17	-0.19	-0.23	-0.32	-0.97	-0.42	-0.77
Morocco	-0.02	-0.15	-0.10	-0.04	-0.11	-0.08	0.01	-0.10
Turkey	-0.16	-0.25	-0.26	-0.30	-0.28	-0.77	0.03	-0.19
USA	-33.15	-22.94	-20.50	-27.63	-31.83	-19.68	-31.73	-33.14
Countries inferior to the 10,000 tonnes								
Positive area								
Israel	4.01	9.05	12.37	10.60	7.42	16.03	9.39	8.43
Costa Rica	5.52	2.10	7.08	8.13	11.31	6.53	7.51	5.51
Malaysia	2.63	2.83	1.51	-0.97	-1.89	-2.54	-1.56	-3.00
Uruguay	2.44	3.22	0.96	2.57	1.79	1.69	3.14	2.56
Paraguay	1.33	0.66	1.18	2.70	1.89	1.83	1.63	1.59
Cyprus	2.05	5.10	4.54	-1.55	1.78	1.59	2.71	0.62
Portugal	0.07	-0.54	-0.30	-1.02	-0.22	-0.46	0.10	-0.31
Negative area								
Thailand	-1.18	-3.20	-3.28	-0.99	-1.15	1.32	-2.11	-0.03
Australia	-14.51	-16.63	-21.09	-15.62	-17.70	-21.49	-17.66	-12.40
New Zealand	-2.35	-2.58	-2.96	-3.85	-3.25	-4.51	-3.16	-2.98

Table III.
Lafay index:
not-concentrated
refrigerated orange
juices – NFC

Source: Our elaborations from UNCOMTRADE (Database: Commodity list)

specialization changes involve countries backed up by a strong orange growing tradition or developing ones? Has the production prowess affected evolution?

As for HS200911, countries with a historic orange production exceeding 10,000 tonnes such as Brazil, Italy and Mexico are in positive area whereas South Africa is a losing position; in the negative area are also countries with a strong agricultural tradition such as the USA, which is worsening, and Greece, India and Indonesia which are getting better. Countries with a production inferior to the 10,000 tonnes, LFI reports Israel, Costa Rica, Uruguay and Paraguay are in the positive area, and countries which are in the negative area but stable are Australia, New Zealand and Thailand. As for HS200919, LFI shows in the lower end distribution the largest number of countries exceeding 10 thousand tonnes are the USA, Indonesia, India, Morocco, Greece, Algeria and Italy; some of which, at the end of the period in consideration, are steering positive (Egypt, Mexico, Spain and Turkey). In countries having production inferior to the 10,000 tonnes, the mature specialization level is present in Israel, Costa Rica, Thailand and Cyprus, and are still pending in Portugal, New Zealand, Paraguay, Uruguay, Australia, Malaysia. With regard to the from-concentrate orange juices category, the index results tell us of the existence of comparative advantage of this product. The producers of from-concentrate orange juices were more open to making incremental innovations that allowed them to implement higher levels of technology and increase their productivity. This worked in favor of

Countries	2009	2010	2011	2012	2013	2014	2015	2016
<i>HS200919</i>								
Countries exceeding 10,000 tonnes								
Positive area								
Argentina	-0.06	-0.02	0.00	0.02	0.00	0.00	0.00	0.01
Brazil	14.20	14.14	13.40	78.95	15.27	12.82	20.82	31.65
South Africa	0.09	0.51	0.24	1.98	0.31	0.33	0.44	0.52
Negative area								
Algeria	-0.19	-0.22	-0.22	-0.31	-0.70	-0.67	-0.39	-0.19
China	0.10	0.13	0.07	0.06	-0.26	-0.44	-0.40	-0.48
Egypt	-0.02	-0.04	-0.07	0.18	-0.05	-0.06	-0.04	0.01
Greece	-0.45	-0.31	-0.33	-0.04	-0.26	-0.21	-0.11	-0.07
India	-0.07	-0.11	-0.08	-0.04	-0.05	-0.03	-0.04	-0.02
Indonesia	-0.12	-0.09	-0.10	-0.04	-0.06	-0.27	-0.06	-0.02
Italy	-2.13	-1.34	-1.17	-0.49	-1.20	-1.32	-0.91	-0.71
Mexico	-0.17	0.00	-0.07	0.68	-0.04	-0.10	0.09	0.65
Morocco	-0.02	-0.09	-0.07	0.11	-0.12	-0.11	-0.02	-0.04
Spain	-2.52	-2.61	-2.65	8.95	-0.90	-1.19	0.21	0.13
Turkey	-0.03	-0.04	-0.08	-0.01	-0.05	-0.10	-0.12	0.05
USA	-8.61	-9.91	-8.87	10.00	-11.89	-8.65	-19.49	-31.48
Countries inferior to the 10,000 tonnes								
Positive area								
Israel	4.86	13.17	11.61	57.70	9.05	4.62	4.21	3.86
Costa Rica	13.53	7.82	6.65	11.54	5.67	7.01	4.92	8.43
Thailand	1.51	3.68	3.65	30.92	5.20	9.44	12.50	11.39
Cyprus	0.50	0.49	1.20	13.87	2.00	0.17	0.44	0.46
Negative area								
Australia	-1.69	-0.11	-3.06	6.13	1.70	1.86	0.08	0.10
Malaysia	-0.48	-4.89	-3.50	1.35	-0.58	-0.75	-1.36	-0.02
Portugal	-10.91	-14.33	-12.80	-14.59	-19.56	-17.93	-17.11	-19.78
New Zealand	-7.30	-5.77	-3.62	-6.44	-3.12	-4.04	-3.25	-3.44
Uruguay	-0.03	-0.10	-0.10	-0.44	-0.31	-0.27	-0.29	-0.48
Paraguay	0.00	0.04	-0.02	-0.04	-0.07	-0.11	-0.14	-0.51

Table IV.
Lafay index:
concentrated orange
juices – FCOJ

Source: Our elaborations from UNCOMTRADE (Database: Commodity list)

longer shelf life, contained market and transport costs and, above all, the food industry's higher use of their products. In fact, from-concentrate orange juice category is used as a raw material in the production of various beverages and other preparations that use semi-finished orange juice as a base. Another important function that has supported the growth and/or development trends in the orange juice sector was found in these countries' socioeconomic relationships to the extent necessary for the effects that can arise from the competitive advantages inherent in countries. In this context, SNA is used as a tool for the identification of the relational structure among countries. A commercial flow network distribution comes to surface indicating interlinkages among different countries regarding HS200919 and HS200911 types. Since only time measures the dynamism of relations (countries) and the variation the product amount (link), SNA has been developed averaging in the 2013/2016 period as to level market circumstances. With regard to the commercial relations among juice exporters, Tables V and VI list the countries in order of the relative number of connections among partner countries; the strength of the node corresponds with the average value of exports (export degree) and the measurement of centrality, which is distinguished by the out farness and out closeness. The relevance of the connectivity grade shows the degree of importance of the country as well as the node dimension that represents the SNA network model of the average exports for both not-from-concentrate refrigerated orange juices and from-concentrate

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Countries	Partners	Export degree	Out farness	Out closeness	Export average total
<i>HS200911</i>					
Countries exceeding 10,000 tonnes					
Brazil	52	141	120,000	71,667	547,235
USA	31	86	150,000	57,333	267,868
Italy	28	60	166,000	51,807	49,945
Spain	36	60	146,000	58,904	40,589
Mexico	25	53	160,000	53,750	94,796
South Africa	16	29	172,000	50,000	10,145
Egypt	18	29	176,000	48,864	5,483
Greece	13	21	217,000	39,631	4,963
Turkey	8	15	183,000	46,995	5,379
Argentina	9	15	215,000	40,000	5,313
China	10	15	238,000	36,134	2,077
Morocco	4	7	231,000	37,229	428
Indonesia	1	1	365,000	23,562	78
Algeria	0	0	7,482,000	1,149	–
India	0	0	7,482,000	1,149	–
Countries inferior to the 10,000 tonnes					
Israel	18	31	183,000	46,995	10,819
Costa Rica	14	25	180,000	47,778	4,732
Malaysia	10	14	255,000	33,725	1,744
Thailand	6	7	205,000	41,951	1,378
Uruguay	4	7	210,000	40,952	1,440
Paraguay	5	6	209,000	41,148	998
Australia	5	5	237,000	36,287	381
Cyprus	3	4	310,000	27,742	3,961
Portugal	4	4	214,000	40,187	129
New Zealand	1	1	322,000	26,708	36
Non-producer countries					
The Netherland	30	56	161,000	53,416	31,825
France	18	27	189,000	45,503	5,076
Germany	9	26	203,000	42,365	1,521
Belgium	8	24	209,000	41,148	4,726
Ireland	10	13	213,000	40,376	1,127
UK	9	12	199,000	43,216	7,251
Canada	5	10	207,000	41,546	12,679
Poland	8	8	224,000	38,393	337
UAE	5	5	239,000	35,983	204
Singapore	5	5	280,000	30,714	201

Table V.
Social network
analysis:
not-concentrated
refrigerated orange
juices – NFC (average
from 2009 to 2016)

Source: UNCOMTRADE (Database: Commodity list)

orange juices. These countries have been characterized by a different “medium strength” (density) of the connection. In particular, the result of the density of the connection is 11.20 percent for not-from-concentrate refrigerated orange juices, while it is 20.10 percent for from-concentrate orange juices. However, regarding the connection, which is the centralization index (out-degree) of the two-network configuration, its results were greatest for not-from-concentrate refrigerated orange juices, 22.24 percent, compared to from-concentrate orange juices, 18.03 percent. Regarding the proximity, which represents the length of the relative path (i.e. the centrality of each network), the results highlight a smaller geodetic distance for from-concentrate orange juices; therefore, for this goods category, there is a centrality measure that helps improve the connection between countries. The topological position of these countries presents differences between HS200919 and HS200911 networks, with a high aggregation degree of some of these countries. Of the last ones, the majority are European countries

Countries	Partners	Export degree	Out farness	Out closeness	Export average total
<i>HS200919</i>					
Countries exceeding 10,000 tonnes					
South Africa	40	77	117,000	64,957	31,408
Spain	26	67	134,000	56,716	198,093
Brazil	14	52	150,000	50,667	1,455,872
USA	23	44	141,000	53,901	19,277
Italy	24	42	136,000	55,882	6,853
China	22	36	130,000	58,462	8,584
Turkey	28	33	133,000	57,143	2,006
Greece	18	30	142,000	53,521	3,568
Egypt	20	23	138,000	55,072	964
Indonesia	9	21	160,000	47,500	313,973
Mexico	6	13	161,000	47,205	22,404
Morocco	5	7	171,000	44,444	1,794
Argentina	4	5	193,000	39,378	223
Algeria	3	4	195,000	38,974	480
India	0	0	5,852,000	1,299	–
Countries inferior to the 10,000 tonnes					
Israel	18	38	148,000	51,351	19,012
Cyprus	23	28	131,000	58,015	3,961
Thailand	18	23	142,000	53,521	2,170
Australia	13	23	178,000	42,697	5,562
Portugal	12	23	154,000	49,351	10,244
Malaysia	9	13	183,000	41,530	1,954
Tunisia	3	4	195,000	38,974	671
Senegal	3	3	195,000	38,974	81
Zimbabwe	2	3	191,000	39,791	512
New Zealand	3	3	239,000	31,799	55
Non-producer countries					
The Netherland	46	110	108,000	70,370	453,236
Germany	36	91	117,000	64,957	319,771
Belgium	27	85	137,000	55,474	777,385
France	33	59	123,000	61,789	47,046
UK	15	30	145,000	52,414	14,423
UAE	21	29	134,000	56,716	2,800
Austria	12	22	191,000	39,791	5,418
Switzerland	10	19	157,000	48,408	34,184
Poland	10	18	157,000	48,408	9,930
Singapore	10	13	194,000	39,175	2,040

Table VI.
Social network
analysis: concentrated
orange juices – FCOJ
(average from
2009 to 2016)

Source: UNCOMTRADE (Database: Commodity list)

showing degree and closeness centrality, some of which act as intermediaries with non-central countries (betweenness centrality). The topological structure of the countries is determined by commercial exchanges in 25 orange producing countries and other non-producing orange countries. Essentially, the placement of the 15 largest producers of orange juices in the network shows that, in respect to not-from-concentrate refrigerated orange juices (Figure 3), centrality is represented with greater intensity, mainly in Brazil, Spain, the USA and Italy. For from-concentrate orange juices (Figure 4), the centrality is represented with greater intensity, mainly in South Africa, Spain, Italy and the USA. In reality, completely apart, we find South Africa that is a hub in a part of the world as shown by the direction and the number of links with countries that are an only contact (happens, as expected, on HS200919). Among the countries with less supply of orange juices (up to 10,000 tons), Israel is the country with the greatest strength in terms of geographical specialization in both HS categories. As for the

New orange juice consumption model

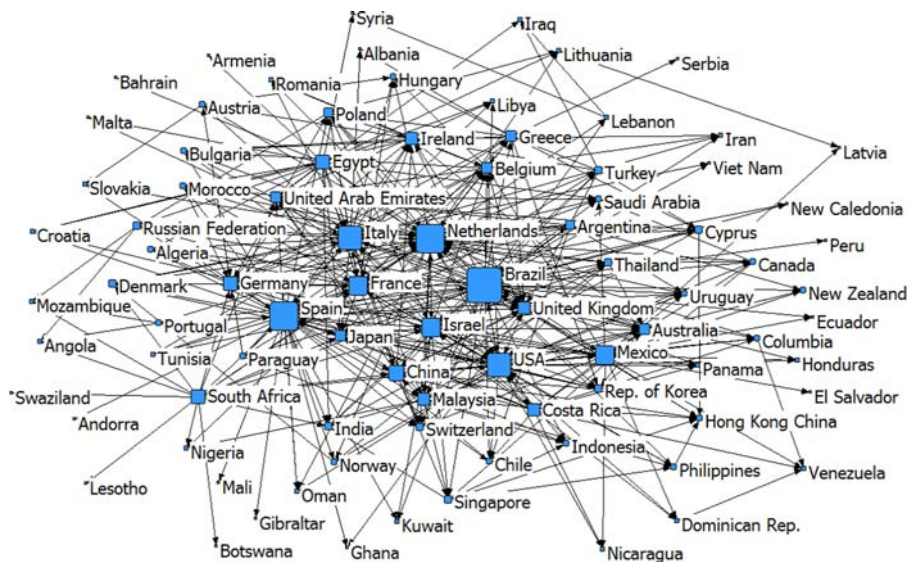


Figure 3.
The network graph of the structure HS200911 – NFC result, position in the world system

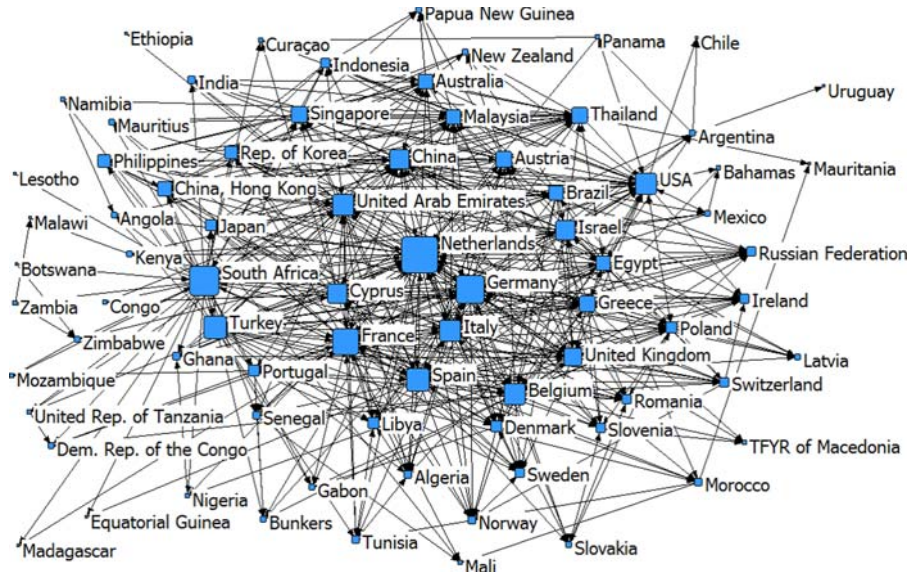


Figure 4.
The network graph of the structure HS200919 – FCOJ result, position in the world system

countries that do not produce orange juice, the Netherlands has a central positioning with high intensity for both HS categories. The intensity of the centrality for Germany and France is very important. This confirms that Europe absorbs most of the world's imports of orange juices. Even more important is that countries in the European market value the specialization and competitiveness of the orange juices produced by countries that dominate international trade in this product.

4. Discussion

Growth and/or development of orange juice, FCOJ above all, has mainly involved Americans countries, less those from the Mediterranean basin, slightly those Afro-Asiatic traditionally not interested in the production sector in question. Americas feed the largest share of international juice traffic currents. In Europe, the highest business even with the orange juices of Greece, Italy and Spain. These countries were helped by the European Union with funding programs to improve the structural characteristics of the fresh oranges production units and of the juices transformation processes industry. In particular, there have been regulatory interventions with reference to the efficiency of the production processes of the orange (improvements in technical means) and models of product specialization (processes industry technology innovation and differentiation in the types of orange juice realized). Then sustainable competitive advantage through a positioning qualitative the production volume (shifting supply) and the product differentiation (shifting demand). With reference to the market of so-called bottlers, we report an interesting legislative initiative of the Italian Parliament (law No. 161 of October 30, 2014) aimed at increasing the percentage of orange juice contained in beverages from 12 to 20 percent (from March 6, 2018; European Commission Notification Number 2014/0316 / I – C50A). Consumers will consume more drinks with high fruit juice (Yang *et al.*, 2017). This makes it possible to make the most of the different characteristics of the juice and the consumption methods that are the main factors responsible for the evolution of the orange juice sector (Sabbe *et al.*, 2013). The world market for orange juices is very dynamic; this is due to the countries specialization models. In times of the Lafay index quantitative distribution, specialization pattern shows high levels of mobility. This may include the producing countries according to the category of juices we are referring. Mature or incomplete specialization levels of production fall onto the industry, which means low, medium or high technological production standards. Therefore, we can have developing countries that have already caught up or exceeded developed countries standards and operate with the latest facilities. The market of one of the two types of orange juice characterizes the country's specialization. This is in line with world demand guidelines, leaning toward HS200919 as opposed to HS200911. Immature export countries rely on import oranges, sometimes to a greater extent than the ones operating domestically or abroad as for not-from-concentrate, aiming to increasing quality and quantity offer wise. HS200919 mature specialization status is believed to be consolidating in the market through time, starting when this type of product was mainly local and currently is keeping up in neighboring countries. Minor semi-finished industrial use of the product is affected by the low storability in time of HS200911, along with logistic cost due to packaging volume, which is exactly the opposite of HS200919, namely the technological, economic and logistic aspects. Specialization models are also based on the assumption that countries are connected to a network of other competing countries involving a system of strategic relations that facilitates the development of new paradigms that are valid for orange juices economic and commercial success. Through these networks, the market is informed about trends and the suitability for the consumption of products in relation to the specific characteristics of the members of their group, even if these members are not producers of raw orange juices, but important importers. We need to underline in the SNA the position of non-producing countries since they actively participate in the exchange. The Netherlands is heavily invested in FCOJ owing to dense connections. This export trade flow is part of the temporary import flow within the European Union as per the EU guidelines benefiting from non-taxability (global outsourcers). In detail, in the importing country, the product is not processed before the final destination, that is to say, that the treatment or assembly (beverages or other) happens in other countries (international fragmentation) including outside the EU (tariff compensation operations). Temporary admission is complementary to WTO guidelines.

5. Conclusions

Profound changes have happened during the course of the last 20 years in the dynamics of the geographic and commodity breakdown of the orange juices destined to the final stage of the product by the industry. The recent international competing setup has obliged all orange producing countries domestic tweaks and international repositioning. In the present era of globalization, the WTO accords are always considered as an indispensable catalyst for the growth and development of the agri-food sector. Trade specialization is important because it affects the exportation of products. At the same time, market liberalization policies have opened new opportunities for placing semi-finished orange juices, given the developing food consumption and the widening of WTO. HS200911 specialization matures t requires of low technological renewal, while HS200919 incomplete specialization requires high technological innovation. Consequently, the mature specialized category resists the renewed specialization, while the incomplete specialization category increases the degree of specialization. The general scheme of specialization is not strictly obvious; however, it is important for producing countries to implement industrial policies to favor the specialization process, while, for the market phase, devising commercial policies (differentiates by category of orange juice) aimed at integrating those envisaged (undifferentiated by category of juices) by the WTO. Free trade tendencies regarding orange juices introduce the WTO tools as opposed to the protection policies in act for the fresh oranges. The protection policies are of different origins; leadership in the export of orange juice is present in the Americans area and as regards the export of fresh orange, the same applies to the Mediterranean basin. Indeed, the European Union mainly protects international trade in fresh oranges. It cannot fail to take into account the fact that, international trade of orange juices is networks developed that tend to favor the relationship between countries with high socioeconomic background in highly unequal contexts, but closeness, with more or less strong ties, in Business to Business markets, that is demand derived for the creation of value-added food products. International trade lobbying pushes adequately specialized countries toward investment (groves) and diversification of both product and process of the oranges (processing industry) destined to the industry, along with the production of the types of juices most requested by international markets. There are three possible final goals: the expansion of the process able cultivar variety and relative differentiation, plants optimization and raw material in the whole and also, last but not least, the effectiveness of the distribution frame as a founding feature to obtain brilliant performances in international markets. In addition, the study suggests that stakeholders issues such as technological dissemination, differentiation of manufactured, quality reliability at a different industry restraint adequate trade specialization.

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