The analysis of competitive interdependencies through "Social Network Analysis": the case study of extra-virgin olive oil

Marchini, Andrea and Diotallevi, Francesco and Fioriti, Linda

Department of Economics and Food Sciences- University of Perugia

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The analysis of competitive interdependencies through "Social Network Analysis": the case study of extra-virgin olive oil ([1])

Andrea Marchini, Francesco Diotallevi, Linda Fioriti[2]

Abstract

This paper aims to analyze, utilizing scanner data, the relationships of competitive interdependency in the extra-virgin olive oil sector in Italy. One of the most important aspects of the competitiveness analysis is the concept of competitive interdependency, as the competitive performances of a product depend upon the number of competitors on the same shop shelf. The "Social Network Analysis" (SNA) has been applied to investigate these interdependencies by elaborating extra-virgin olive oil sales data from a national level survey.

The SNA methodology has provided a useful tool to analyse the competitive relationships between each selected extra-virgin olive oil brand and the others on the same shop shelf. The conclusions aim to discuss the results of the study, which has provided useful information about high quality Italian olive oil segments, and to evaluate future opportunities and actual limits of this new methodology to approach the analysis of competitive brand networks.

JEL codes: Q130

Key Words: Social Network Analysis (SNA), extra-virgin olive oil market, competitiveness.

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[2] *Andrea Marchini* is Associate Professor at the Department of Agricultural Economics and Food Sciences at the University of Perugia, *Francesco Diotallevi* is a research assistant at the Department of Agricultural Economics and Food Sciences at the University of Perugia, *Linda Fioriti* is a Ph.D. student in Agro-Industrial Economics and Politics.

1. Introduction

The analysis of competitive performance has always excited economists at both macro and microeconomic level (Barrell, 1993). In this sense, it is possible to identify three fields of study. The macroeconomic field, whose purpose is to identify and analyze performance indicators from the various economic systems (Woods, 2000; IMD, 2009; Cesaretti and Scarpato, 2010); a second field of analysis on business competitiveness and defence of the competitive advantage, in the various company analysis (Epstein and Manzoni, 2008) and industrial organization paths (Porter, 1998); and finally a third field based on the conceptual system of marketing management, whose purpose is to analyze the performance of individual products in competitive arenas (Cooper and Nakanishi, 1998; Castaldo, 1995).

This last course of study is frequently the central feature of corporate decision making. Nevertheless, one of the main problems of this process lies in identifying indicators able provide an exhaustive representation of the competitive results and therefore promptly report the need to rethink product policies and distribution strategies.

With regard to the agro-food product, the development of information technology has enabled many methodologies aimed at defining trade marketing and visual merchandising strategies to be applied to scanner data (Capps, 1989).

In this context, one of the problems regarding competitiveness analysis is linked to the concept of competitive interdependence (Brooker, 1994). In other words, the different “depths” of the assortments of large-scale distribution lead, within the same product category, to a different communicative power of the products on the shelf. As a consequence, the competitive results of product are strictly dependent on the number of competitors on each shelf of the store.

In this context, “competitive interdependence” analysis can make use of Social Network Analysis (SNA), considering the products as individuals whose presence on the shelf generates an interaction - in this case not of a cooperative nature as sought in social networks - creating rivalry within the arena. In other words, we can assume the hypothesis that there is a competitive interaction between a pair of brands (dyads) whenever these are present simultaneously on the same shelf in the store. This hypothesis is supported by the empiricism of visual merchandising, but is lacking in checks on an analytical and managerial level.

On the following pages, starting from the methodology proposed by Castaldo (Castaldo and Molteni, 1992; Castaldo *et al*, 1993; Castaldo, 2001) for the peeled tomatoes sector, the competitive interdependencies of a sector at the heart of the Italian agro-food system, extra-virgin olive oils, have been analyzed, also in order to test the proposed methodological approach.

2. The competitive context of extra-virgin olive oils in Italy

In Italy, olive production consisted of 464.000 tons, and the total sector turnover was 3.2 billion euros in 2009. National consumption, representing 4.6 billion euros, has been growing slowly in the last years, mainly because of the international financial crisis which brought to food consumption reduction (ISMEA-IPSOA, 2010).

The most relevant aspect of this new scenario is the tendency for extra-virgin to erode the market share of conventional olive oil, in line with the growing weight that the concept of "quality" has taken on in food (Databank, 2005).

Consumption per household amounts to around 11 litres per year in the case of extra-virgin/virgin oil and 7 litres for conventional olive oil.

The olive oil market, unlike that of other agro-food products, has a low level of industrial concentration: the top three companies actually cover less than 37% of sales volume in hypermarket, supermarket and convenience store channels. The concentration is, on the other hand, significant in the conventional olive oil sector, where the top four industries account for around two thirds of total sales by volume (Coldiretti, 2007).

In such a complex and mature scenario, there is scope for penetration only for companies able to ensure widespread distribution of their product and able to support an aggressive policy on prices and investments downstream, especially given the great weight of large scale distribution in the marketing of extra-virgin olive oil (in 2009, it accounted for almost 60% in volume and over 78% of the olive oil total).

At the same time, retail chains have seized the opportunity to directly exploit margins through the development of commercial brands, which currently account for about 15% of the volume. In such a competitive oil market in terms of price-related convenience, high-priced oils are gaining a discreet but growing presence, especially those which are organic, PDO and PGI, which make it possible to increase margins and qualify the image of the distribution chain.

In recent years, Italy has been witnessing an evolution of the supply structure, characterized by a few large industrial packagers operating on the entire market and many small and medium-size manufacturers, specialized in niche markets or in contract manufacturing. Commercial brands are increasingly important, both for manufacturers, which sometimes produce for brands that represent models of excellence in their countries, and for retail chains, which achieve a higher margin on their own-brand product (ISMEA, 2007).

The importance of the selection of stores and sales force training and retraining has grown in recent years. These factors are especially important for companies that implement a niche strategy and, in general, for all companies operating in high-end catering and specialist retail, where it is necessary to adapt the positioning of the product to the type of premises and shops served (Chevalier, 1994).

Product innovation remains a critical success factor, especially in terms of a company's ability to offer new mixtures and satisfy local tastes. From this point of view, product innovation is particularly important in the extra-virgin olive oil sector, where new products (flavoured, traditional etc.) are constantly being introduced.

As regards the depth and breadth of the range, this is a relevant factor for the leaders, which implement particularly marked segmentation and differentiation policies, but becomes secondary for the "followers", whose offer, on the other hand, is composed of fewer references. To put it in an extremely concise manner, the entire sector is faced with a range of threats and opportunities.

As regards threats, the most significant issues are related to the alternation of collected volumes and price volatility at source. This brings with it risks relating to the stability of consumer prices, in turn connected to the danger of a deterioration in

quality of oil blends because of the shift of the mix towards lower grades in "bad" years. Secondly, attention should be paid to the high age of olive-processing plants and sector operators, and the low level of mechanization achieved so far, which exposes the sector to strong competition from foreign oil products (in particular from Spain and Greece, but also from non-EU countries in the Mediterranean and South America). In addition to this, we must also consider the risks of fraud (adulteration, dilution and counterfeiting) during production, processing and bottling of the product, the regulatory uncertainty regarding labelling and the origin of the product and finally Italian olive-growing techniques which are not suitable for reducing production costs, over which labour costs still weigh very heavily.

One of the major opportunities for the sector is the widespread nature of the Mediterranean diet in the world and the recognition of the quality and health benefits of olive oil by the consumer. Consumer awareness about food-health relationship is growing, raising negative perception towards processed food too distant from agriculture world (Sodano *et al.*, 2010). Therefore, the ability of all sector operators to provide end consumers with greater safety and guarantees on the quality of the product and its origin therefore assumes increasing importance. In addition, in order to best exploit the potential of the sector, greater market segmentation is essential for companies, not only from the point of view of production, but also in terms of marketing and identifying more precise segmentation criteria, relating to new preferences and perceptions from consumers.

Other opportunities are represented by the following: research into an affirmation of new uses and consumption opportunities, the development of niche policies in terms of products (organic, PDO, PGI, etc.) and channels (e-commerce, mail order etc.), improvement in raw material procurement policies needed to save cost and in relationships with suppliers and retailers (Grant, 1999). Finally, in the long run, it is necessary to optimize, rationalize and restructure the Italian olive-growing system, especially in the processing and marketing sectors.

3. The study methodology

The study is based on sales data from *SymphonyIRI* which, on a sample basis, brings together information from several stores nationwide. In particular, sales of extra-virgin olive oils were extracted at random over 12 months straddling 2006 and 2007, in 99 stores divided as follows: 33 hypermarkets (HYP), 33 supermarkets (SUP) and 33 convenience stores (SPT).

In view of the fact that the category of extra-virgin olive oil today is very segmented, we preferred to carry out the competitiveness analysis dividing the entire category into three segments as follows: "Common extra-virgin", "100% Italian extra-virgin" and "PDO/PGI extra-virgin". The next step, in order to contain the large number of brands present, was to identify the top 15 competitors for each segment and reconstruct their competitive situation in the various stores through the "adjacency matrices", in which each cell shows the overall number of competitive relations occurring between the various brands in the stores (Knoke and Kuklinsky 1982; Lomi 1992 and 1997; Burt 1992; Castaldo, 2005).

Secondly, a set of indices was calculated as proposed by the theoretical model of the SNA for the structural analysis of the competitive networks in each sub-category.

Finally, the last step to achieve a representation of the competitive net-work is to highlight the set of relationships through the UCINET software 6.0[3] (Borgatti, Everett, Freeman, 1992) which makes it possible to create a graphical representation of the matrices shown in diagrams 1, 2 and 3, which highlight the following aspects:

- The segment that links two brands shows the actual existence of interdependence;
- The distance of the segment shows the strength of this interdependence;
- The numbers show the contacts between the two brands quantitatively.

3.1. Indices

The first synthetic index of the network is the **density index**, which provides a general indication of the level of competitive overlap. This index represents the percentage of connections that exist between individual subjects (z_{ijk}) in the total of all possible links in the network (N^2-N) and can be expressed in quantitative terms as follows:

[1] $$\frac{z_{ijk}}{N^2 - N}$$

The index takes the value zero when there is no contact between the subjects and the value one when all nodes are linked to each other, thus connoting the network with the highest level of competitive cohesion. Consequently, this index is a useful tool for understanding the competitive structures, filtered from the distribution, in reference to the various sub-categories of extra-virgin olive oil.

After considering the competitive network as a whole, it is necessary to define the position occupied by each subject within the network itself and the competitive pressure exerted by each brand on the individual competitors.

An initial position indicator is the **index of centrality**, which emerges from the adjacency matrix (which contains the frequencies with which the individual interdependencies occur within the competitive network) by adding together the number of interdependencies in which each brand is "involved". The totals per column (or per row) are an indicator that is able to qualify the individual subjects in terms of centrality and makes it possible to identify the brands that are most present in the context of competitive "dyads".

The second indicator, useful in order to express the intensity of competitive pressure, is represented by the **index of potential**, obtained from the difference between the market share and the index of centrality of each brand in the network. When the indicator assumes a positive value, this means that the brand considered has been able to generate sales in excess of the competitive pressure received (positive potential), in other words, the brand analyzed has been able to withstand the competitive pressure exerted by other brands. In contrast, if the value assumed by the

[3] An important element of the software is the ability to determine the brands that have a central "strong" position and so-called "outliers", i.e. those brands that have few relationships and are nevertheless "on the outskirts" of key competitiveness points.

index is negative, it means that the brand has a negative potential and that it is not able to withstand the competitive pressure of its competitors, and hence generate sales.

3.2. The competitive balance through the out-degree and in-degree indices.

One last opportunity offered by the SNA analysis is the possibility to construct a competitive final balance with reference to a specific brand of analysis. The balance assumes the calculation of the index of absorption (in-degree) and index of release (out-degree), showing the direction in which the individual competitive relationships occur between the different brands.

In order to calculate these indices, it is necessary to consider the initial "brand/stores" matrix, which contains the market shares of brands in the stores where they are present. To do this, it is first necessary to calculate the market share of the brands in the store where they are present, as well as the market share held by each store.

The market share of a brand in every store in which it is present, weighted by the market share of the store itself, gives an indication of the competitive strength of the brand in relation to the value of the store in which this strength is exerted. Clearly, a brand that holds a significant share exerts a competitive strength greater than a brand that has a smaller share.

4. The results

Turning now to the analysis of the results, it is possible to highlight certain aspects that characterize the sub-categories investigated. Firstly, each sub-category has its own density index (56.85% for "Common extra-virgin", 3.4% for "100% Italian extra-virgin", 4.1% for "PDO/PGI extra-virgin"). As expected, the first segment ("Common Extra-Virgin") has a greater number of contacts, despite the fact that the level of industry concentration is limited in relation to other agro-food industry products.

This clearly involves high competitive interaction between the brands that coexist within this highly pervasive network throughout the country. Conversely, the other types of oil are more closely linked to a tradition of local consumption and to more regionalised or patchy distribution.

Tables 1, 2 and 3 of the sub-categories highlight (circled) the points of contact for each brand, together with the indices of centrality and market shares. For each segment, a different situation can be observed.

Table 1 - Interdipendent matrix of Common extra-virgin olive oil *sub* category

Density = 56,85%	BERTOLLI FRAGRANTE	BERTOLLI GENTILE	BERTOLLI ROBUSTO	CORICELLI CONDIEXTRA	DELICATO 1	DELIZIA	FARCHIONI	IL CASOLARE	IL FRANTOLIO	IL POGGIOLO	LA COLOMBARA	MONINI CLASSICO	SAGRA TRADIZIONALE	SAN GIOVANNI	SASSO	**TOTAL OF CONTACTS**	**INDEX OF CENTRALITY (%)**	**TOTAL NO. SURVEYED IN STORES**	**MARKET SHARE (%)**	**SHARE IN TURNOVER (€ x 1.000)**
BERTOLLI FRAGRANTE	0	81	74	65	75	44	70	74	80	38	37	79	78	26	68	889	7	81	5	452
BERTOLLI GENTILE	81	0	84	73	81	53	80	84	96	39	42	69	90	31	76	979	9	98	10	964
BERTOLLI ROBUSTO	74	84	0	63	73	47	69	72	83	36	37	82	78	27	70	895	8	84	5	443
CORICELLI CONDIEXTRA	65	73	63	0	62	35	67	69	74	28	29	72	69	25	55	786	6	74	4	401
DELICATO 1	75	81	73	62	0	44	69	74	80	38	36	79	80	30	67	888	6	81	5	437
DELIZIA	44	53	47	35	44	0	39	42	52	27	31	51	46	24	41	576	5	53	7	612
FARCHIONI	70	80	69	67	69	39	0	79	79	33	32	79	78	23	61	858	7	81	4	415
IL CASOLARE	74	84	72	69	74	42	79	0	83	38	35	83	81	29	66	909	8	85	4	363
IL FRANTOLIO	80	96	83	74	80	52	79	83	0	38	41	95	88	30	74	993	9	97	11	994
IL POGGIOLO	38	39	36	28	38	27	33	38	38	0	24	39	38	21	36	473	4	39	3	301
LA COLOMBARA	37	42	37	29	36	31	32	35	41	24	0	40	37	16	37	474	4	42	3	324
MONINI CLASSICO	79	69	82	72	79	51	79	83	95	39	40	0	88	31	75	962	9	97	17	1.556
SAGRA TRADIZIONALE	78	90	78	69	80	46	78	81	88	38	37	88	0	29	69	949	8	90	13	1.235
SAN GIOVANNI	26	31	27	25	30	24	23	29	30	21	16	31	29	0	26	368	3	31	4	390
SASSO	68	76	70	55	67	41	61	66	74	36	37	75	69	26	0	821	7	76	5	473
TOTAL																**11.820**		**1.109**		**9.360**

Source: SymphonyIRI data processing.

Table 2 - Interdipendent matrix of the PDO/PGI extra-virgin olive oil sub category

Density = 4,13%	AGRI DESANTIS	AMABILE UMBRIA	COLLI MARTANI	DAUNO GARGANO	FARCHIONI	LIGUSTRO	MONINI VAL DI MAZARA	MONTALBANO	PRIMOLI	SPAGNOLETTI	TERRA DAUNA	TERRA DI BARI	TURRI	VENTURINO	VIOLA	**TOTAL OF CONTACTS**	**INDEX OF CENTRALITY (%)**	**TOTAL NO. SURVEYED IN STORES**	**MARKET SHARE (%)**	**SHARE IN TURNOVER (€ x 1.000)**
AGRI DESANTIS	0	8	5	8	9	4	8	0	5	0	16	8	6	0	2	79	8	20	5	11,6
AMABILE UMBRIA	8	0	5	13	10	13	15	2	7	2	11	14	9	1	10	120	14	30	21	44,8
COLLI MARTANI	5	5	0	1	12	0	2	1	0	0	5	5	3	0	0	39	6	14	5	9,6
DAUNO GARGANO	8	13	1	0	5	4	13	1	4	0	9	5	7	0	4	74	6	13	3	6,7
FARCHIONI	9	10	12	5	0	5	6	1	1	0	10	6	6	0	0	71	8	18	6	13,5
LIGUSTRO	4	13	0	4	5	0	5	0	5	2	4	8	4	1	6	61	9	19	11	23,9
MONINI VAL DI MAZARA	8	15	2	13	6	5	0	1	5	0	9	6	8	0	4	82	7	15	5	10,0
MONTALBANO	0	2	1	1	1	0	1	0	0	0	0	0	1	0	0	7	3	7	4	8,7
PRIMOLI	5	7	0	4	1	5	5	0	0	0	3	6	2	0	2	40	5	12	11	23,3
SPAGNOLETTI	0	2	0	0	0	2	0	0	0	0	0	1	2	3	2	12	2	4	3	6,2
TERRA DAUNA	16	11	5	9	10	4	9	0	3	0	0	7	6	0	2	82	9	19	3	6,4
TERRA DI BARI	8	14	5	5	6	8	6	0	6	1	7	0	3	1	9	79	10	23	7	15,4
TURRI	6	9	3	7	6	4	8	1	2	2	6	3	0	2	1	60	5	11	9	18,0
VENTURINO	0	1	0	0	0	1	0	0	0	3	0	1	2	0	1	9	2	4	4	7,6
VIOLA	2	10	0	4	0	6	4	0	2	2	2	9	1	1	0	43	6	13	3	6,5
TOTAL																**858**		**222**		**212,3**

Source: SymphonyIRI data processing.

Table 3 - Interdipendent matrix of the 100% Italian extra-virgin olive oil *sub* category

Density = 3,44%	ALCE NERO	AZIENDA OLEARIA DEL CHIANTI	CHIANTI	CIRIO	CLEMENTE	DESANTIS	DIOMEDE	FRANTOIO DELLA FATTORIA	IL CHIECINO	IL PODERINO	LE MASSERIE DEL PARCO	LIFRANTO	NICCOLINI	ORO VERDE	SAN GIULIANO AMABILE	**TOTAL OF CONTACTS**	**INDEX OF CENTRALITY (%)**	**TOTAL NO. SURVEYED IN STORES**	**MARKET SHARE (%)**	**SHARE IN TURNOVER (€ x 1.000)**
ALCE NERO	0	0	0	3	4	10	0	10	0	0	10	0	0	11	0	48	4	11	2	14,3
AZIENDA OLEARIA DEL CI	0	0	3	1	0	2	1	1	3	0	1	3	3	5	0	23	2	6	21	199,4
CHIANTI	0	3	0	0	0	2	0	0	3	0	0	3	3	5	0	19	2	6	4	35,5
CIRIO	3	1	0	0	7	15	2	10	0	0	7	0	0	15	0	60	7	17	5	46,4
CLEMENTE	4	0	0	7	0	8	1	8	0	0	7	0	0	9	0	44	4	9	2	18,3
DESANTIS	10	2	2	15	8	0	5	20	0	0	24	0	0	37	0	123	19	48	25	237,9
DIOMEDE	0	1	0	2	1	5	0	1	0	0	1	0	0	2	0	13	2	6	3	26,5
FRANTOIO DELLA FATTO	10	1	0	10	8	20	1	0	0	0	17	0	0	25	0	92	12	29	2	20,6
IL CHIECINO	0	3	3	0	0	0	0	0	0	0	0	3	3	4	0	16	1	3	5	49,6
IL PODERINO	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	4	1	2	2	14,5
LE MASSERIE DEL PARCO	10	1	0	7	7	24	1	17	0	0	0	0	0	25	0	92	16	37	5	48,3
LIFRANTO	0	3	3	0	0	0	0	0	3	0	0	0	3	4	0	16	1	3	9	96,3
NICCOLINI	0	3	3	0	0	0	0	0	3	0	0	3	0	4	0	16	1	3	2	14,8
ORO VERDE	11	5	5	15	9	37	2	25	4	2	25	4	4	0	3	151	27	64	11	112,6
SAN GIULIANO AMABILE	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5	1	3	2	15,4
TOTAL																**722**		**247**		**950,5**

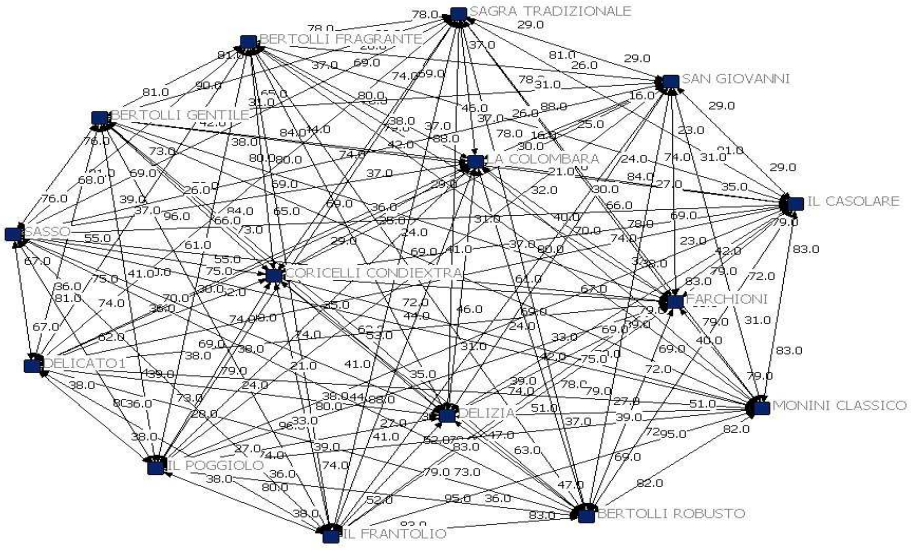
Source: SymphonyIRI data processing.

In the “Common extra-virgin” sub-category (Table 1), we note how almost all the brands have the greatest number of contacts with the “Monini Classic” and “Bertolli Gentile” brand, which result as being the products that are the most widespread and with the highest index of centrality (approximately 9%), despite the fact that their market shares, whilst being among the highest in the sector, are not at all similar. As already shown for the index of centrality, the distinguishing feature of the sector is the high penetration of all brands (1.109 analyzed in total in stores), again demonstrating that the sector under analysis is the most mature of the three taken into consideration. Consequently, within it, there is more competition for companies to grab space in large-scale distribution brands. In this competitive situation, there are no large differences between diffusion of the product on the shelves and the level of market share.

In the “PDO/PGI extra-virgin” sector (Table 2) the situation appears completely different: a low number of contacts (222) can be noted. The “Amabile Umbria” brand is the most widespread (over 120 contacts, and an index of centrality of 14%). In absolute terms, the greatest number of contacts within large-scale distribution is observed between “Agri Desantis” and “Terra Dauna”, with 16 contact situations. In this sub-category, cases are common in which a modest index of centrality corresponds to a high market share (e.g. “Primoli”, “Amabile Umbria”).

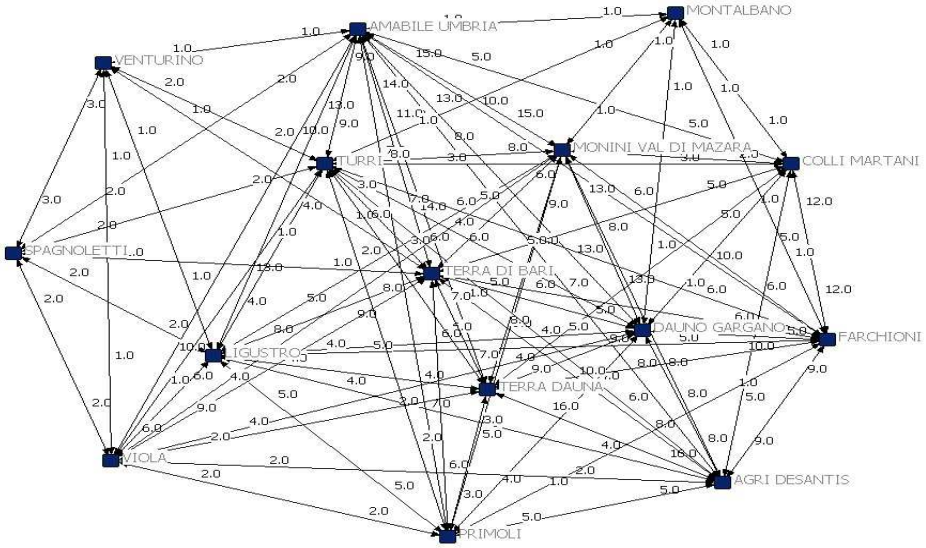
Finally, in the “100% Italian extra-virgin” sector (Table 3) we can see a high concentration of contacts for the “Oro Verde” brand, which is the most widespread with a total of 151 contacts. This diffusion does not, however, correspond to a similar market share, as previously reported for the “PDO/PGI extra-virgin” oils. It can be viewed in a direct and clear way the competitive scenarios of different sub-categories of extra-virgin olive oil through the graphical display of networks.

Fig. 1 - Network of first 15 brand of Common extra-virgin olive oil in Italy



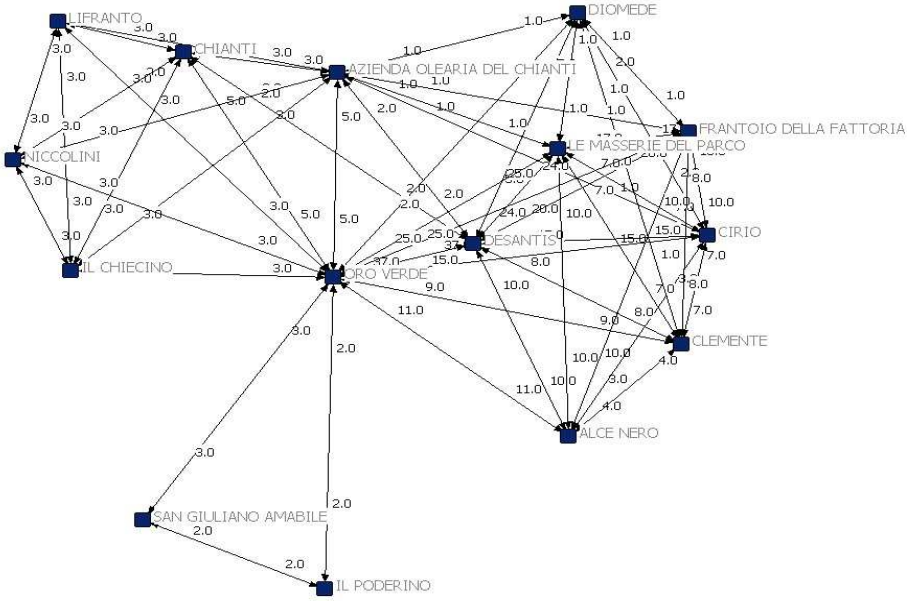
Source: UCINET 6.0 data processing

Fig. 2 - Network of first 15 brand of PDO/PDI extra-virgin olive oil in Italy



Source: UCINET 6.0 data processing

Fig. 3 - Network of first 15 brand of 100% Italian extra-virgin olive oil in Italy



Source: UCINET 6.0 data processing

4.1. The out-degree and in-degree indices and the competitive balance

The competitive balance serves a purpose that is more managerial than the indices analyzed so far. In this case, in fact, it is not all the products that are analyzed but the relationships that develop between one brand and the rest of the category to understand its individual position within the network. Tables 4, 5 and 6 consider the indicators of the competitive balance from the point of view of the leading companies in the sub-category. For example, among the common extra-virgin brands, "Monini Classic" is the brand leader and, in relation to this brand, the out-degree and in-degree indices have been calculated (Table 4). The out-degree value that the brand leader, "Monini Classic", occupies is far superior to all the in-degree values of the other brands. In other words, the competitive pressure exerted by "Monini Classic" is greater than the pressure to which the leader is subjected from other brands. The highest out-degree and in-degree values are those of "Il Frantolio" (out-degree equal to 139 and in-degree equal to 48), while the lowest values are those of "La Colombara" (out-degree 71 and in-degree 16).

In general, the brand "Monini classic" has very high out-degree indices compared to all the competitors brands examined; so the brand is placed in a strong position of high commercial and competitive power against them, assuming, at the same time, a role of market competitiveness example for both old and established competitors and for those facing the market now. Going to study the differences between the out-degree index and the in-degree index, values very high are noted for the majority of the brands surveyed, and this means that there is a difference in competitive strength very higher among the economic players in the market; this reflects the situation of the same olive oil market, not only in relation to a specific segment, which is characterized by extreme fragmentation and a strong competitive value regardless of the geographical area or economy context that is being analyzed. In particular, for some segments, the competitive flow is on average stronger than in other segments, as can be seen from the values of the differences in the following tables.

Table 4 - The Out and In values in the Monini Classico Perspective

OTHER TYPE OF OIL BRAND	OUTDEGREE	INDEGREE	DIFFERENCE
BERTOLLI FRAGRANTE	135	22	113
BERTOLLI GENTILE	139	47	92
BERTOLLI ROBUSTO	129	22	107
CORICELLI CONDIEXTRA	130	20	110
DELICATO 1	135	21	114
DELIZIA	90	29	61
FARCHIONI	112	20	92
IL CASOLARE	134	17	117
IL FRANTOLIO	139	48	90
IL POGGIOLO	124	15	109
LA COLOMBARA	71	16	55
SAGRA TRADIZIONALE	137	31	106
SAN GIOVANNI	89	22	67
SASSO	130	44	86

Fonte: SymphonyIRI data processing

Among the products in the "*PDO/PGI Extra-Virgin*" sub-category, the leader in terms of turnover is the "Amabile Umbria" brand, which, however, does not hold a very large market share in stores where the contacts occur. The difference between the in-degree and out-degree of this brand is therefore not particularly large, but it nevertheless exerts a competitive strength greater than that to which it is subject in the majority of interactions.

In the case of the "Amabile Umbria"-"Montalbano" and "Amabile Umbria"-"Primoli" pairing, with out-degree values of 1.6 and 13 and in-degree values of 3.5 and 31 respectively (Table 5), the balance is negative and the brand leader is the one subject to a greater competitive strength than the strength it exerts on the other two brands. This means that these brands are able to obtain a larger market share in stores where they are found at the same time as the "Amabile Umbria" leader. In the following tables it is possible to evaluate and verify this hypothesis seeing the differences between "Amabile Umbria" and other brand.

Table 5 - The Out and In values in the Amabile Umbria perspective

PDO AND PGI BRAND	OUTDEGREE	INDEGREE	DIFFERENCE
AGRI DESANTIS	41	10	31
COLLI MARTANI	9,5	5,6	3,8
DAUNO GARGANO	46	11	34
FARCHIONI	51	13	38
LIGUSTRO	51	35	16
MONINI VAL DI MAZARA	52	17	35
MONTALBANO	1,6	3,5	-1,9
PRIMOLI	13	31	-18
SPAGNOLETTI	1	1	0
TERRA DAUNA	48	9	39
TERRA DI BARI	29	23	6
TURRI	46	23	23
VENTURINO	1	0	1
VIOLA	15	10	5

Fonte: SymphonyIRI data processing

The network of "*100% Italian Extra-Virgin*" has lower values that the "*Common Extra-Virgin*" sub-category, both due to the low market shares of the sector and its lesser presence in stores (in some cases even equal to zero). The "Desantis" brand is the market leader, nevertheless, the "Desantis"-"Chianti" and "Desantis"-"Diomede" dyads have out-degree values of 1 and 5.6 and in-degree values of 10 and 8.4 respectively (Table 6).

Analyzing the competitive balance, it is thus apparent that "Chianti" and "Diomede" hold a market share that is greater than the leader in stores where they are present at the same time.

The highest out-degree and in-degree values are held by the competitive pairing "Desantis" - "Oro Verde" with an out-degree of 75 and an in-degree of 25, where competitive force is in favour of the leader "Desantis".

Finally, this sub-category has different degrees of distributive rarefaction with low levels of reciprocal contact between products and this is in virtue of the fact that it is a relatively new market sector and is still limited to certain brands.

Table 6 - The Out and In values in the Agri Desantis perspective

100% ITALIAN BRAND	OUTDEGREE	INDEGREE	DIFFERENCE
ALCE NERO	18	5	13
AZIENDA OLEARIA DEL CHIANTI	1,3	0,5	0,8
CHIANTI	1	10	-9
CIRIO	30	16	14
CLEMENTE	32	6	26
DIOMEDE	5,6	8,4	-2,9
FRANTOIO DELLA FATTORIA	66	6	60
IL CHIECINO	0	0	0
IL PODERINO	0	0	0
LE MASSERIE DEL PARCO	66	14	51
LIFRANTO	0	0	0
NICCOLINI	0	0	0
ORO VERDE	75	25	50
SAN GIULIANO AMABILE	0	0	0

Fonte: SymphonyIRI data processing

5. Discussion and summary considerations

The study has made it possible to highlight numerous aspects, of both a methodological and application-related/managerial nature. Regarding the latter, the study contributes to a continuous enhancement of large-scale distribution sales information. In managerial sciences, analyzing market shares and splitting them into simple indicators is an established practice for all trade marketing analysis. The analysis approach using SNA, however, makes it possible to obtain more accurate information for the management of the distribution function, taking into account the phenomena of competitive interdependence in the individual stores.

From a methodological perspective, the analysis using SNA still has its limits. It is not possible, for example, to investigate whether a particular performance is linked to the proximity of the products on the shelf rather than the organization of the planogram or the forms of shelf management of the category. The scanner data identifies the co-presence of brands, but not their position on the shelf and therefore it is not possible to get further information about the quality of category management (Cotterill, 1994). Furthermore, the indications emerging from the competitive balance do not explain why certain objectives are achieved. In this case, it is the manager who has to investigate the effects of other marketing tools responsible for the results obtained, in order to understand the strategies of competitors or suggest a different category policy for distribution.

Important aspects have come to light from a sector point of view. More than ten years after its birth, the “PDO/PGI Extra-Virgin” sub-category, for example, confirms itself as a true market segment with very varied levels of competitive interdependence and interesting margins of manoeuvre for an improvement in distribution policies. The same thing cannot be said for the “100% Italian Extra-Virgin” oil, a segment that is still too new and rare, as is the diametrically-opposed “Common Extra-Virgin” sector, in which all the main competitors have a similar “contact” situation, attenuating the competitive advantage of distribution policies.

A further observation emerges from the analysis of the indices of density and centrality. In particular, an increasingly pronounced dualism is consolidated between the major industrial brands on the one hand and small and medium-sized companies on the other. The latter, thanks to the growing segmentation of the market, are able to conquer new space on the shelves and gain increasing weight in the competitive scenario.

Finally, a consideration regarding the fact that the analysis was forced to exclude Private Label products, due to lack of data, although these nevertheless constitute a strategic link in the oil market, as well as other markets, and large-scale distribution is dedicating increasing display attention to them.

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