

## **OLIVE OILS, ARE THEY ALL THE SAME? A SENSORY AND MARKET STUDY WITH ORDINARY CONSUMERS**

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## **Introdução**

Olive oil is a very traditional food product. It has been used by mankind since ancient times and it had become economically important in several cultures, especially in the Mediterranean countries. (IOC, 2016; Oliveira et al., 2012), According to Silva (2011), Brazil has taken the initiative as a player in the market in 2008 with the production of the first Brazilian olive oil. So, the novelty in this study resides in the fact that Brazil is an emergent market in the olive oil sector.

## **Problema de Pesquisa e Objetivo**

Scientific studies concerning olive oil market are mainly conducted in European countries (Delgado & Guinard, 2011). Therefore, this study contributes for the advancement of this research subject in non-traditional markets of olive oil. This paper provides an initial step to understand ordinary consumer's sensory perception and purchase intent of olive oil. It also proposes to investigate sensory perception and purchase intent of a Brazilian olive oil brand.

## **Fundamentação Teórica**

Consumers in different cultures purchase and evaluate goods based on specific or in general attributes. Olive oil is a product which consumption is marked by identity and local culture (Achabou et al., 2010 cited by Dekhili et al., 2011). During purchase process, consumers establish preferences combining attributes of the product: price, quality, country of origin etc. Olive oil is also chosen by these attributes and other ones (Jiménez-Guerrero et al., 2012).

## **Metodologia**

After the completion of the sensory acceptance and purchase intent tests, consumers answered a questionnaire with predictive questions in order to outline the profile of olive oil consumers. This research corpus consisted of 115 consumers. Data were tabulated and processed using the software: SPSS (Statistical Package for Social Sciences); and SENSOMAKER (Pinheiro, Nunes & Viotoris, 2013). For the analysis it was used descriptive statistics and multivariate statistics.

## **Análise dos Resultados**

The majority of ordinary consumers could perceive intrinsic attributes of olive oil and distinct it from compound oil. This result is an important contribution concerning the divergence in literature about knowledge of intrinsic attributes by ordinary or initial consumers (Pagliuca & Scarpato, 2014; Espejel, Fandos & Flavián, 2008). Results show a distinction among the extract groups (utilitarian, naïve and expert consumers).

## **Conclusão**

In general, it was observed that consumers showed coherent sensory perception towards olive oil characteristics, distinguishing them from compound oil. This fact is an important contribution of this study since it can be inferred that even consumers of a non-traditional olive oil markets have a certain degree of knowledge of its intrinsic attributes. However, regarding purchase intent and preference, consumers displayed a mixed behavior pattern not totally convergent to the sensory aspects.

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# OLIVE OILS, ARE THEY ALL THE SAME? A SENSORY AND MARKET STUDY WITH ORDINARY CONSUMERS

## 1. Introduction

Olive oil, extracted from the olive fruit, is a very traditional food product. It has been used by mankind since ancient times and it had become economically important in several cultures, especially in the Mediterranean countries. In American countries, the Olive tree is present since 1520 with Spanish and Portuguese expeditions during the discovering times. Recently, the species is also present in South of Africa, China, Japan and Australia (IOC, 2016; Oliveira *et al.*, 2012).

Spain, Italy and Greece have prominence in production, exportations and consumption of this product. Spain is the market leader with one million and three hundred thousand tons of olive oil produced in 2015/2016 crop (IOC, 2016).

These market realities are available in the *International Olive Council (IOC)* website. IOC is an entity responsible to gather worldwide data and information concerning the olive sector such as: socioeconomic, nutritional, technological aspects, among others. Regarding consumption of olive oil, the same producing countries are also the main consumers of the product. The market of the olive oil is, therefore, traditional and well established in the Mediterranean countries (IOC 2016; Mesquita & Thomé, 2012).

Besides economic importance, the rising of both production and consumption of olive oil is also related to its benefits for human health. According to Escrich, Moral and Solanas (2011), the consumption of moderate quantities of extra virgin olive oil during life, can positively contribute to reduce the risk of breast cancer. In this way, olive oil consumption is a phenomenon which should be studied by specific motivations, not only by its quantitative expansion observed recently. One of these motivations is the adoption of the “Mediterranean diet” as a factor of longevity. This diet is considered healthy and is based on food rich in olive oil (Jiménez-Guerrero *et al.*, 2012).

Given economic and health factors, it has been observed a shift of the olive oil market towards other regions of the world. For Mili (2010), the North American market is the largest purchaser of olive oil outside Europe. The author also states that Brazil presented an increase on imports of the product. In the USA, olive oil consumption increased exponentially in the last 20 years (mainly due to “Mediterranean diet” expansion and increasing consumer awareness about the health benefits of olive oil), reaching 310 thousand tons of olive oil in 2014/2015 crop (IOC, 2016; Roselli, Carlucci, & De Gennaro, 2016; Jiménez-Guerrero *et al.*, 2012; Delgado & Guinard, 2011).

In an attempt to bring up an empiric and academic contribution for the olive oil market in Brazil, this paper provides an initial step on understanding ordinary consumer’s sensory perception and purchase intent of olive oil, investigating whether the reality of olive oil consumption is similar or not to literature findings. It is also proposed to investigate sensory perception and purchase intent of a Brazilian olive oil brand. According to Silva (2011), Brazil has taken the initiative as a player in the market in 2008 with the production of the first Brazilian olive oil.

So, the novelty in this study resides in the fact that Brazil is an emergent market in the olive oil sector, which can open both research and business agenda for the country. Another issue is that scientific studies concerning olive oil market are mainly conducted in European countries (Delgado & Guinard, 2011). Therefore, this study contributes for the advancement of this research subject in non-traditional markets of olive oil.

This paper is structured as follows: The next topic proposes respectively, a brief review about food consumer behavior and olive oil consumer behavior. In sequence the olive

oil market in Brazil is characterized. The following topic describes the research method, and the last two topics present respectively, the discussion of the research results and the conclusions drawn from this paper with the main contributions and suggestions for future studies.

## **2. Theoretical background**

### **2.1. Food consumer behavior and purchase intent**

Understanding the purchase behavior is an arduous and challenging task since no one buys a product unless there is a problem, need or desire (Blackwell, Miniard & Engel; 2009). Consumer behavior is often irrational and unpredictable; consumers often say one thing and do another. Nevertheless, the effort spent trying to understand this behavior is noble, as it provides the necessary understanding of how to plan products and marketing programs that can meet the consumers' needs (Ferrell & Hartline, 2006).

As for the food industry, Lucchese *et al.* (2006) postulate that food plays an important role in everyday life, since its function goes beyond simply supplying vital necessities. Complementarily, Lowe, Bocarlsly and Parigi (2008) argue that food consumption was never only just to satisfy physical hunger, because the quantity, frequency and food selection are affected by several variables besides hunger, such as: appetite, cost, accessibility, culture, nutritional values, emotions, among others.

According to Rezende and Avelar (2012), the food industry has assumed an unprecedented dynamism. Processing and distribution of food have gone through intensive innovations, leading to changes in how people eat. The consumer is never satisfied, after all, its expectations regarding the products, access and choice are increasingly diversified. Consumers today are presented with a great deal of information and supply in the market is even greater, situation that leaves the consumers in a privileged position. Thus, the food market must evolve into a consumer-oriented market (Bragante, 2012; Dagevos, 2005).

One of the ways of predicting consumer behavior is to investigate what they intend to do. Purchase intent is an interesting way of studying this behavior (Blackwell *et al.*, 2009). Purchase intent is composed by a group of factors that lead a person to behave in a certain way generating a tendency to act with a specific behavior towards a given object, brand or company, in a particular moment and situation, leading or not to the purchase itself (Magalhães & Damacena, 2006). Namely, purchase intent means that consumers could buy a product over and over again after having appraised it (Tariq *et al.*, 2013).

Within the academia attempts to understand and measure consumer purchasing intentions has been somewhat well explored. This has been a fairly common practice in consumer behavior studies (Ferreira, Ávila & Faria, 2010). In the managerial level, purchase intent has substantial importance, because companies aim to increase sales of their products in order to maximize their profits (Tariq *et al.*, 2013), and as Ferrell and Hartline (2006) complement, understanding the processes that consumers and companies use to make purchasing decisions is the fundamental first step in developing mutually long-term beneficial relationships.

### **2.2. Olive Oil consumer behavior**

Consumers in different cultures purchase and evaluate goods based on specific or in general attributes. The knowledge of them by managers allows the elaboration of more effective marketing strategies. Olive oil is a product whose consumption is strongly marked by identity and local culture (Achabou *et al.*, 2010 cited by Dekhili *et al.*, 2011).

During purchase process, consumers establish preferences combining different attributes of the product such as: price, quality, country of origin etc. Olive oil is also evaluated by this attributes and other specific ones (Jiménez-Guerrero *et al.*, 2012).

Consumers use specific and intrinsic characteristics to evaluate perceived quality of food products: sensory attributes (flavor, color and appearance). However, it is frequently hard for food consumers to get this information before purchase. So these consumers also use extrinsic attributes to evaluate the product such as: price; brand, labels, production methods country or region of origin (Mesquita & Andrade, 2014; Dekhili, Sirieix & Cohen, *et al.*, 2011).

Olive oil is a unique product within the food consumer behavior's field. The main attributes that lead to loyalty of olive oil consumer are intrinsic such as: color, appearance, and flavor. Pagliuca and Scarpato (2014), point out that experts in olive oil's consumption give more importance to its intrinsic attributes than ordinary ones. These consumers are also aware of organic farming and olives certification.

On the other hand, Delgado and Guinard (2011) show the existence of disconnections on consumer behavior of olive oil between experts and ordinary consumers. Regarding ordinary consumers, literature points out that the more knowledge consumers about olive oil, the more extrinsic attributes are highlighted in purchase such as: price, origin, since intrinsic attributes are already part of these consumers (Jiménez-Guerrero *et al.*, 2012; Espejel, Fandos & Flavián, 2008).

As Barbieri *et al.* (2015) complement, there is a gap between consumers' subjective preference and consumers' objective knowledge about extra virgin olive oil consumption. Moreover, Santosa *et al.* (2013), points out that sensory and non-sensory factors affect consumer choice for olive oils in a multidimensional behavior.

This paper proposes, by studying ordinary consumers, to shed some light on this theoretical debate between different perceptions and attributes of olive oil. It is important to mention, that according to Roselli, Carlucci and De Gennaro (2016) studies about olive oil consumption in emerging markets (where olive oil is not a traditional food) have its own characteristics. So, studies on olive oil and even these specific markets can be both distinct from traditional regions of the product.

### **3. Research context: Olive Oil market in Brazil**

The Brazilian olive oil market is mainly dominated by foreign production. Importations increased 12% over the last four years; and values in the 2014/2015 crop came to 74 thousand tons of olive oil (IOC, 2016). Portugal and Spain are the main supplier markets (Mesquita & Thomé, 2012; García, 2008). In recent market data, the olive oil market in Brazil still has strong presence of Portuguese and Spanish brands, whereas 80% of the olive oil sales in Brazil are represented by Extra Virgin olive oils and the whole sector presented in 2015 revenues estimated in 1.3 billion Reais (ABRAS, 2016).

Taken this reality into account, Brazilian researchers developed in 2008 the first olive oil "made in Brazil" (Silva, 2011). This event has promoted a production dynamics in Minas Gerais - MG (Southeast of Brazil), especially in "Serra da Mantiqueira" region, with the main purpose of reducing Brazil's dependence on the international market of olive oil, and also creating a new economic activity in the country with the domestic production (Mesquita & Andrade, 2014; Oliveira, Oliveira & Alves, 2012). Thus, olive oil's supply chain in Brazil is somehow structured and at the same time, still in formation, with production also present in the South of the country (Mesquita & Andrade, 2014; Silva 2013).

Due to this production structuring, Brazilian olive sector has all the conditions to gain a production scale, given the production potential and strong consumer market. For this, it is

necessary an organizational capacity, which should not be created spontaneously. Such capacities may be obtained by many forms, according to specific needs and local demands, following worldwide experiences such as: formation of associations and cooperatives of diverse sizes (Oliveira, Nunes & Oliveira, 2012).

Therefore, this sector of the Brazilian economy is in expansion on the Southeast and South regions of the country. This fact demands constant research efforts to improve olive oil supply chain with adoption of “best practices” both concerning farming of olives, as well as industrial activities (Alves *et al.*, 2014).

Concerning the purpose of this paper, one initiative to develop the olive oil sector in Brazil is to evaluate quality standards of national production, according to Brazilian consumer’s demands (Rodrigues, 2015). The next topic presents the research methods used in the study.

#### **4. Research Methodology**

This paper is characterized as a descriptive study of quantitative nature. According to Gil (2008), descriptive research aims, as its own name suggests, at describing the characteristics of certain populations or phenomena. For the author, one of its peculiarities is the use of standard data collection techniques, such as the questionnaire. Quantitative research, according to Pinheiro *et al.* (2004), is a statistical study that numerically explains the assumptions made, allowing the survey of a large volume of information adopting as its main feature a structured study with objective questions.

The individuals who composed the research *corpus* were olive oil consumers in the city of Lavras, MG – Brazil. Regarding the sampling, it was used the non-probabilistic by accessibility sampling, in which according to Aaker, Kumar and Day (2001), elements are selected for their convenience, by volunteering, or even accidentally. The authors also state that this type of sampling is feasible when it is desired to quickly and inexpensively obtain information. Data collection was conducted during the months of May and June of 2016 in the Rex Supermarket (Lavras Shopping Mall branch). Survey participants were selected according to the following criteria:

In the supermarket’s oils aisle, the researchers monitored – at a certain distance – the consumers who were selecting olive oils on the shelf. When a consumer selected any given olive oil from the shelf and placed in his/hers shopping cart, the researchers approached the person inviting him/her to participate on the research. Having accepted to participate, the consumers were taken to a workbench assembled at the end of the aisle so they could answer the sensory analysis and the questionnaires.

Each consumer was invited to taste four different oil samples. The products included in the analysis were commercial extra virgin olive oils that – for the purpose of this study as well as to preserve the identity of the companies and brands – were codified as elucidated both in Table 1 and Figure 1.

All the olive oils chosen, were in conformation to Brazilian legislation and regulations (ANVISA, 2005) regarding olive oils in Brazil. Extra Virgin olive oil was chosen due its unique and distinguishable features (flavor, aroma, among others) in comparison to other oils and by its predominance in the Brazilian market (Barbieri *et al.*, 2015; ABRAS, 2016). For the purpose of testing if the Brazilian consumer knows what there are in fact buying and eating, a sample of compound oil (85% soy oil and 15% olive oil) was included in the analysis.

**Table 1.** Characterization of the studied oils samples.

| Brand (codified) | Country of origin | Type         | Maximum acidity | Ingredients                  | Market position   |
|------------------|-------------------|--------------|-----------------|------------------------------|---|
| EGO              | Portugal          | Extra virgin | 0,5%            | 100% olive oil               | National and regional leader (southeast) *                |
| OAE              | Portugal          | Extra virgin | 0,5%            | 100% olive oil               | 2 <sup>nd</sup> place national and regional (southeast) * |
| GEA              | Brazil            | Extra virgin | 0,5%            | 100% olive oil               | First olive oil produced in Brazil **                     |
| GOA              | Brazil            | Compound oil | Undeclared      | 85% soy oil<br>15% olive oil | National and regional leader (southeast) *                |

Source: prepared by the authors based on the product's packaging and the companies' websites.

\* extracted from: ABRAS (2015, p.41 and p.98), APAS (2015, p.57 and p.122).

\*\* extracted from: Silva (2011, p.26-27).



**Figure 1.** Bottles of the oils samples used in the study.

Source: author's personal archive.

The codified samples were offered to consumers in small pieces of sliced bread. This type of bread was chosen for its bland flavor (highlighting the olive oil flavor) and also because it absorbs the oil, facilitating tasting. Samples were offered to consumers separately and in random arrangement in order to avoid the demand effect (Hernandez, Basso & Brandão, 2014; Charness, Gneezy & Kuhn, 2012) – which is the impression that the first sample is better than the second, which in turn is better than the third and so on.

After tasting each sample, consumers filled the sensory acceptance form, evaluating on a 7-point hedonic scale (1 – extremely disliked to 7 – extremely liked) the sensory attributes: flavor, appearance, viscosity, color, aroma and overall impression. They also filled the purchase intent form, evaluation on a 5-point scale (1 – definitely not buying to 5 – definitely buying) the intention to buy each of the evaluated oils.

In order to elucidate the concept of sensory analysis, Minim (2013) and Dutcosky (2011) define it as a scientific discipline used to evoke, measure, analyze and interpret reactions to food and materials characteristics the way they are perceived by the senses of sight, smell, taste and hearing.

The sensory acceptance test is considered an affective sensory method, that through the use of hedonic scale aims at analyzing a product's degree of acceptance, identifying how much the taster liked or disliked the product (Dutcosky, 2011). For the sensory acceptance test with untrained consumers, Minim (2013) suggests a minimum sample of 50 tasters.

However, this study yielded a number greater than the minimum sample proposed by the author, since 115 tasters constituted this research *corpus*.

After the completion of the sensory acceptance and purchase intent tests, consumers answered a questionnaire with predictive questions in order to outline the profile of olive oil consumers. The questionnaire followed the structured model, which according to Malhotra (2001) consists of closed questions which were tabulated and assessed with the aid of multivariate statistics. Hair *et al.* (2005) note that in multivariate analyzes, for each predictive variable of the questionnaire a minimum of five respondents are required. As the questionnaire used for multivariate analysis consisted of 13 predictive variables the minimum established sample size was of 65 respondents. However, as previously mentioned, this research *corpus* consisted of 115 consumers, thus exceeding the minimum sample size established by the authors.

Data were tabulated and processed using the software: SPSS (Statistical Package for Social Sciences); and SENSOMAKER (Pinheiro, Nunes & Vietoris, 2013). For the analysis it was used descriptive statistics (frequency distribution and crosstabs) and multivariate statistics (cluster analysis, discriminant analysis and parallel factors analysis).

## **5. Results and discussion**

In this section, the main results and analyzes related to this work are presented. First, the sample of 115 consumers surveyed is demographically described. Second, it is discussed the aspects related to sensory analysis and purchase intent associated with the key attributes indicated by consumers. Finally, consumer segmentation was performed in order to characterize them in more details regarding both demographic and predictive variables on olive oil consumption.

### **5.1. General characterization of the sampled consumers**

Of the 115 analyzed consumers, 54% are male and 46% female. 42% of the respondents were between 19 and 30 years old, 41% between 31 and 50 years, while the remaining 15% were over 50 years and 2% up to 18 years old. Regarding the household income of consumers – in current values in the period in which the survey was conducted – it was observed that 34% earn between 4 and 6 minimum wages, 26% between 2 and 4 minimum wages, 13% earn up to 2 minimum wages and 27% have family income greater than 6 minimum wages.

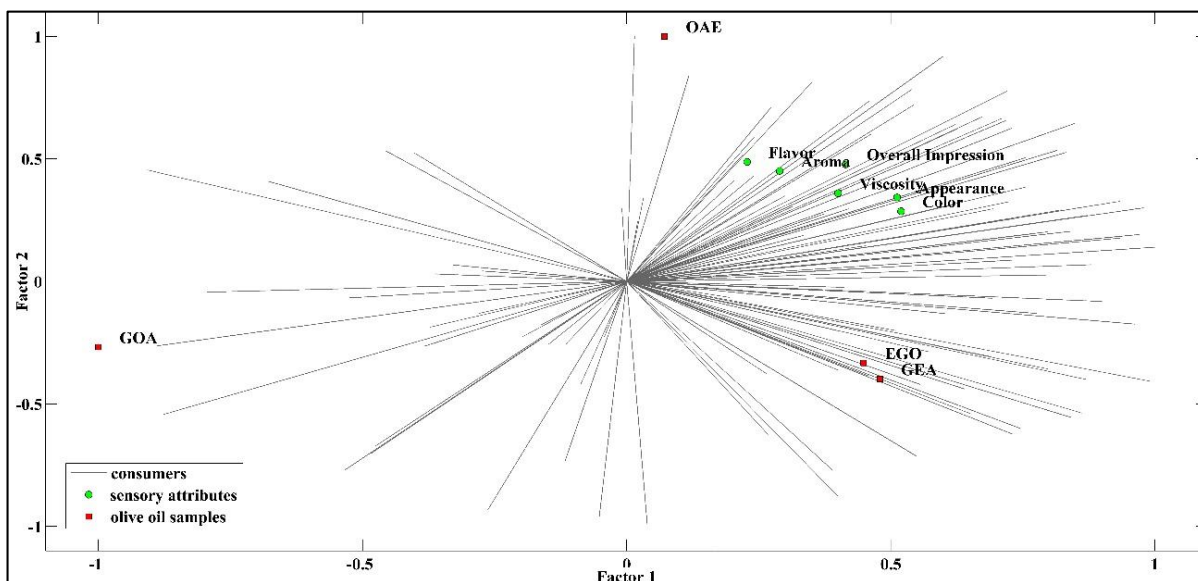
In terms of education 31% of consumers have not yet completed the higher education whilst 12% have completed it, 15% have not yet completed post-graduation whilst 27% have. The remaining 15% finished high school or have lower education. In general, consumers have demonstrated a certain homogeneity in relation to sex, 61% are into the C or higher classes (IBGE, 2016), and 54% have at least a university degree.

### **5.2 Sensory analysis of the researched olive oils**

In general, it was observed that 54% of consumers have stated that regularly consume olive oil (5 times a week or more), while the remaining 46% consume the product from 1 to 3 times per week. These results serve as a parameter for conducting this topic, as the respondents reported having a certain knowledge degree about the consumption of olive oil (Jiménez-Guerrero *et al.*, 2012). This data is corroborating theory which states that available information concerning extra virgin olive oil is one of the key factors that drive purchase intent among olive oil consumers (Delgado & Guinard, 2011).



In order to clarify the results obtained in the sensory analysis with consumers, it was conducted the parallel factor analysis (PARAFAC) according to the studies carried out by Antonialli *et al.* (2015) and Nunes *et al.* (2011). Results are displayed in Figure 2.



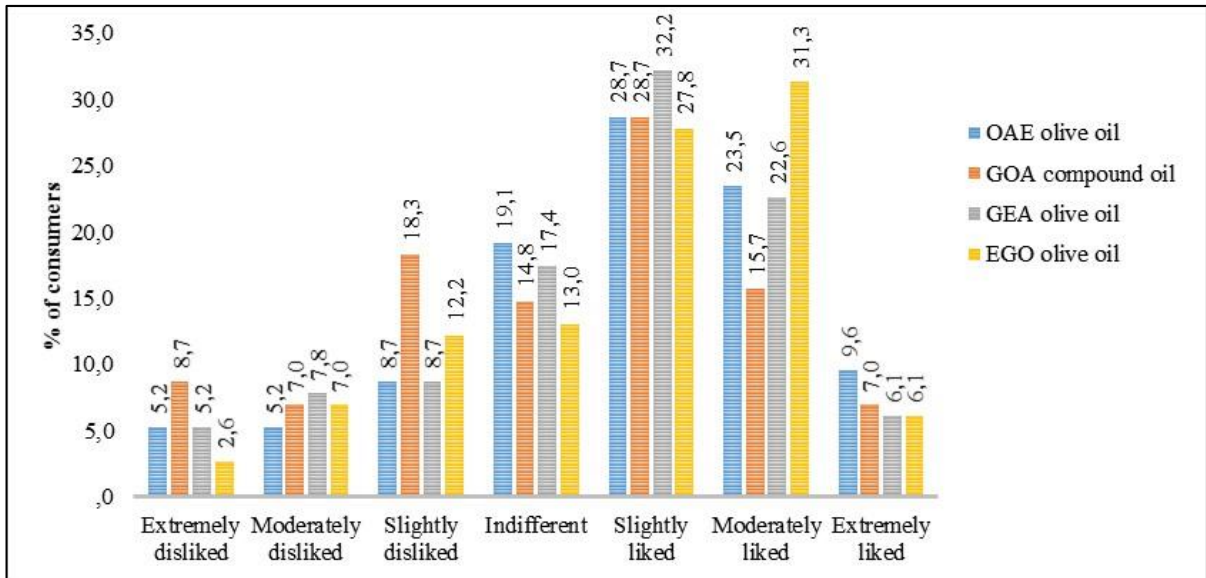
**Figure 2.** Parallel Factor Analysis of the sensory acceptance attributes of the different oils surveyed.  
Source: Prepared by the authors.

By analyzing Figure 2, it is observed that the four samples had distinct degrees of sensory acceptance by consumers. It is noteworthy that each vector (line) shown in the figure correspond to one of 115 consumers, and the greater the length of the line, the greater the sensory acceptance of the oil sample in which the vector is directed. Drawing a horizontal and a vertical axis through the origin of the figure, four quadrants are obtained.

It is observed that all the sensory attributes (appearance, viscosity, color, flavor and overall impression), and the olive oil sample OAE are anchored in the upper right quadrant of the figure. This same quadrant holds the largest number of consumers (vectors), which indicates the preference of most consumers for the olive oil sample OAE. In the lower right quadrant, the oil samples EGO and GEA are anchored, there are also a significant number of respondents towards these samples, indicating that they've had similar sensory acceptance.

At last, in the lower left quadrant, it can be seen the compound oil sample GOA, which had the lowest number of consumers facing towards it and was also among the four oil samples studied the farthest from sensory attributes, that is, the compound oil was in the consumers' opinion, the sample that had the lowest sensory acceptance rates. This fact demonstrates that the majority of ordinary consumers could perceive intrinsic attributes of olive oil and distinct it from compound oil. This result is an important contribution concerning the divergence in literature about knowledge of intrinsic attributes by ordinary or initial consumers (Pagliuca & Scarpato, 2014; Espejel, Fandos & Flavián, 2008).

In order to complement the data obtained in Figure 2, a more detailed analysis of the attribute "overall impression" was carried out, since, as shown by Minim (2013), this attribute reflects a holistic view of others. Figure 3, elucidates the results regarding the attribute "overall impression" of the surveyed samples.

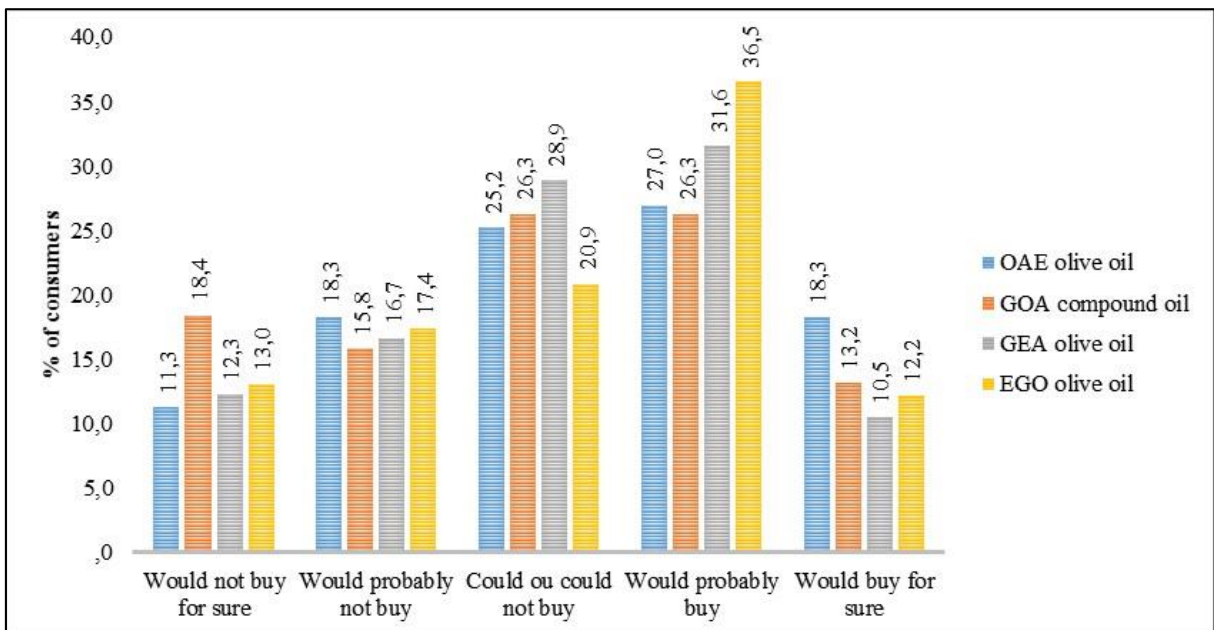


**Figure 3.** Consumers' overall impression of the researched samples.  
Source: Prepared by the authors.

As shown in Figure 2, the rejection rates (disliked - sum of the values) related to the compound oil GOA, were higher than the rates obtained in other samples, a fact which corroborates the data presented in Figure 2. Similarly, it is observed that the acceptance rate (like - sum of the values) for olive oils compared to the compound oil had shown higher values.

### 5.3. Purchase intent and consumer preference

Regarding the purchase intent, it was noticed that the compound oil GOA displayed the worst results (approximately 40% claimed they would probably or certainly buy the product, while the remainder 60% said they would not or could not buy it – see Figure 4), assumption that might be related to the sensory attributes perceived in the sample.



**Figure 4.** Consumers' purchase intent of the researched samples.  
Source: Prepared by the authors.

The other surveyed samples showed similar results in terms of purchase intent (sum of the positive and sum of the negative items of purchase intent), obtaining greater results in purchase intent when compared to the compound oil sample.

When asked about their preference, some peculiarities were found in the results, given that the olive oil OAE was preferred by 31% of consumers followed the compound oil GOA with 28% of the preference, while the EGO and GEA olive oils achieved respectively 21% and 20% of consumer preference. These results elucidate the presence of a paradox between the sensory impression (Figures 3 and 4) and the sensory preference of the samples by the consumers, given that sensorially, the GOA compound oil obtained the worst sensory results and ranked second in the consumers' preference.

These findings demonstrate a gap between sensory aspects and consumers' preference of olive oil. The results show that sensorially, consumers could perceive intrinsic (objectives) attributes of olive oils, distinguishing them clearly from compound oil. However, regarding purchase intent and preferences (subjective aspects), it was observed a contradictorily behavior of the consumers. In other words, the sensory perceptions, do not necessarily match with purchase intent and preferences. Such elements are coherent with the findings of Barbieri *et al.* (2015) and the junction of both aspects also confirms in this study, the multidimensional behavior of olive oil's consumer (Santosa *et al.*, 2013). The next topic presents results concerning consumers' segmentation regarding olive oil preferences.

#### **5.4. Consumers' segmentation regarding olive oil preferences**

The final stage of the study aimed at identifying olive oil consumption patterns among the surveyed consumers. On the basis of the sensory analysis variables and the predictive variables from the questionnaire, a cluster analysis was performed. Of the 115 surveyed consumers, 109 composed this analysis since 6 consumers were excluded due to missing data. The criteria for groups extraction by the cluster analysis was done by cross-tabulation of the groups with the sensory and predictive variables of the questionnaire, taking into account the results of the chi-squared test.

When two groups were considered in the cluster analysis, the results of the chi-squared test indicated that from the 41 cross tabbed variables, 24 were significant at 1%, three at 5%, and 14 were not significant. On the other hand, when three groups were considered in the analysis, 29 variables were significant at 1%, five at 5%, and only 7 were not significant. Therefore, for this consumers' segmentation analysis three groups were taken into account.

Of the 109 consumers that composed the corpus of the analysis, 71 (65,1%) were placed in Group 1, 22 (20,2%) were placed in group 2 and a minority of 16 consumers (14,7%) in Group 3.

Demographically, the three groups showed no significant difference by the chi-squared test, that is, regarding gender, age, household income and education, the three groups were very similar. This is an important result found in this study that shows a specificity of the emergent markets in relation to traditional markets of olive oil (Roselli, Carlucci & De Gennaro, 2016).

As pointed out by Vlontzos and Duquenne (2014), in Greece, a traditional market of olive oil the relevant factors in purchasing olive oils, are: age, educational level, and residents' location near to olive oil producing zones. Other reason for these differences found in this study is that the sample of consumers here analyzed showed higher educational level, and that olive oil is expensive and Brazil is not a traditional market, given the absence of production zones in the country, it was not expected to find relations with this factor.

With respect to the average frequency of olive oil consumption, the groups showed very different behaviors (chi-squared:  $p < 5\%$ ), as can be seen in Table 2.

**Table 2.** Average olive oil consumption.

|                  | <b>group 1</b> | <b>group 2</b> | <b>group 3</b> |
|------------------|----------------|----------------|----------------|
| 1 time per week  | 25,40%         | 9,10%          | 6,30%          |
| 3 times per week | 23,90%         | 50,00%         | 12,50%         |
| 5 times per week | 16,90%         | 9,10%          | 18,80%         |
| Daily            | 33,80%         | 31,80%         | 62,40%         |
| <b>Total</b>     | <b>100,00%</b> | <b>100,00%</b> | <b>100,00%</b> |

Source: prepared by the authors.

It is noted that group 1 (71 consumers) presents a more homogeneous dispersion pattern of consumption, as group 2 (22 consumers) despite of also displaying certain dispersion of consumption, it is clear that 50% of consumers consume olive oil twice a week and 31.8% claim to consume it daily. Finally, group 3 (16 consumers) was the group with the highest rates of olive oil consumption, whereas 62.4% claimed they consume the product daily and 18.8% said they consume it up to 5 times a week.

Another major difference noted among the groups was with respect to the preferred oil samples (chi-squared  $p < 1\%$ ). Among the four analyzed samples, it can be seen in Table 3 that group 1 showed greater preference for the olive oil OAE (35.8% of consumers), followed by the olive oil GEA (23.9%) and the olive oil EGO (20.9%), and the sample that showed greater rejection in this group is the compound oil GOA (19.4%). As for group 2, it was noted that the vast majority of consumers (76.2%) preferred the compound oil sample GOA, followed by the olive oil GEA and EGO (each with 9.5%) and finally by the olive oil OAE (4.8%). Finally, group 3 showed the opposite behavior of group 2, since only 7.1% of consumers preferred the compound oil GOA and the large majority preferred the olive oils, where 42.9% preferred the olive oil OAE, 35.7% the olive oil EGO and 14.3% preferred the olive oil GEA.

**Table 3.** Groups' preferred olive oil sample.

|                  | <b>group 1</b><br><b>Utilitarian consumers</b> | <b>group 2</b><br><b>Naïve consumers</b> | <b>group 3</b><br><b>Expert consumers</b> |
|------------------|--|--|---|
| OAE olive oil    | 35,80%   | 4,80%                                    | 42,90%                                    |
| GOA compound oil | 19,40%   | 76,20%                                   | 7,10%                                     |
| GEA olive oil    | 23,90%   | 9,50%                                    | 14,30%                                    |
| EGO olive oil    | 20,90%   | 9,50%                                    | 35,70%                                    |
| <b>Total</b>     | <b>100,00%</b>                                 | <b>100,00%</b>                           | <b>100,00%</b>                            |

Source: prepared by the authors.

As can be seen in Table 3, it was decided to give names to the groups. Taking into account the average consumption of olive oil, the preferred sample and the results of sensory analysis, it was decided to name group 1 as "utilitarian consumers," group 2 "naïve consumers" and group 3 "expert consumers". The results of the discriminant analysis are used to elucidate the groups features and to clarify in which variables the groups differed.

#### **5.4.1. Discriminant analysis of the sensory variables**

The discriminant analysis showed in sensory terms that from the 28 variables studied (7 sensory attributes multiplied by 4 samples) only 5 discriminated groups. Table 4 details, in descending order, each of the five variables and their relations with each of the three groups.

It was noticed that the first three variables that most discriminated the groups address the overall impression attribute (OAE, GOA and GEA respectively) and in this sense it is important to note that both the variable 1 and 3 are relative to olive oils and variable 2 is relative to the compound oil.

**Table 4.** Sensory variables that discriminated the groups

|  |                        | Utilitarian consumers | Naïve consumers | Expert consumers |
|--|------------------------|-----------------------|-----------------|------------------|
| <b>1. OAE Olive oil overall impression</b> (Wilk's Lambda 0,597; Chi-squared p=0,000)    | disliked at some level | 4,20%                 | 54,50%          | 31,30%           |
|  | indifferent            | 11,30%                | 27,30%          | 43,80%           |
|  | liked at some level    | 84,50%                | 18,20%          | 25,10%           |
| <b>2. GOA Compound oil overall impression</b> (Wilk's Lambda 0,408; Chi-squared p=0,000) | disliked at some level | 32,30%                | 0,00%           | 87,60%           |
|  | indifferent            | 12,70%                | 18,20%          | 12,50%           |
|  | liked at some level    | 55,00%                | 81,90%          | 0,00%            |
| <b>3. GEA Olive oil overall impression</b> (Wilk's Lambda 0,282; Chi-squared p=0,000)    | disliked at some level | 5,60%                 | 63,60%          | 37,60%           |
|  | indifferent            | 16,90%                | 18,20%          | 18,80%           |
|  | liked at some level    | 77,50%                | 18,20%          | 43,80%           |
| <b>4. EGO Aroma</b> (Wilk's Lambda 0,225; Chi-squared p=0,000)                           | disliked at some level | 7,00%                 | 31,70%          | 56%              |
|  | indifferent            | 28,20%                | 45,50%          | 31%              |
|  | liked at some level    | 64,90%                | 54,40%          | 13%              |
| <b>5. OAE Aroma</b> (Wilk's Lambda 0,209; Chi-squared p=0,000)                           | disliked at some level | 7,00%                 | 68,20%          | 25,00%           |
|  | indifferent            | 22,50%                | 22,70%          | 56,30%           |
|  | liked at some level    | 70,50%                | 9,10%           | 18,70%           |

Source: prepared by the authors.

For the variables 1 and 3 (overall impression of OAE and GEA olive oils) the group of “utilitarian consumers” gave the highest overall impression grades for the samples because, 84.5% and 77.5% liked at some level the OAE and GEA olive oils respectively; while the group of “naïve consumers” assigned the worst overall impression grades for the samples (54.5% and 63.6% disliked at some level the OAE and GEA samples respectively). Finally, the group of “expert consumers” stood in an intermediate position, with greater homogeneity in the hedonic scale regarding the samples.

Regarding the sample GEA (Brazilian olive oil) there was a good sensory acceptance by the utilitarian (77.5%) and experts (43.8%) consumers, which empirically shows consumers with a good degree of sensory acceptance, consistent with the results of Rodrigues (2015), which shows good sensory results regarding domestic olive oils.

With respect to variable 2 (overall impression of the compound oil GOA) the data in Table 4 makes clear the preference of the “naïve consumers” for this sample, given that 81.9% liked it at some level. Oppositely the group of “expert consumers” showed large rejection towards the GOA sample, since the vast majority, 87.6%, disliked it at some level. The “utilitarian consumers” were in an intermediate position, given that 55% liked the GOA sample at some level, 12.7% proved indifferent and 32.3% disliked it at some level.

Concerning the variables 4 and 5 (EGO and OAE aroma) it was observed that the “utilitarian consumers” behaved similarly for both samples, giving good sensory grades for the attribute, as 64.9 % and 70.5% of consumers liked at some level the aroma of these olive oils respectively. The “expert consumers” group showed a higher level of rejection and indifference to the aroma of the olive oils EGO and OAE respectively. On the other hand, the group of “naïve consumers”, (because they have liked more the GOA compound oil sample), did not value much the attribute aroma of the olive oils when compared to the other two groups.

#### 5.4.2. Discriminant analysis of the predictive variables

As for the predictive variables from the 13 variables, 5 discriminated groups. Table 5 details, in descending order, each of these five variables and their relationships to each of the three groups.

**Table 5.** Predictive variables that discriminated the groups

|  |                        | Utilitarian consumers | Naïve consumers | Expert consumers |
|--|------------------------|-----------------------|-----------------|------------------|
| <b>1. Packaging of olive oil is important to me</b> (Wilk's Lambda 0,611; Chi-squared p=0,002)         | disagree at some level | 1,40%                 | 27,30%          | 6,30%            |
|  | indifferent            | 16,90%                | 27,30%          | 12,50%           |
|  | agree at some level    | 81,70%                | 46,20%          | 81,30%           |
| <b>2. Price of olive oil is important to me</b> (Wilk's Lambda 0,600; Chi-squared p=0,019)             | disagree at some level | 18,30%                | 45,50%          | 56,30%           |
|  | indifferent            | 26,80%                | 18,20%          | 6,30%            |
|  | agree at some level    | 54,90%                | 36,30%          | 37,50%           |
| <b>3. I like to buy olive oils from different countries</b> (Wilk's Lambda 0,541; Chi-squared p=0,015) | disagree at some level | 2,80%                 | 18,10%          | 25,10%           |
|  | indifferent            | 8,50%                 | 4,50%           | 12,50%           |
|  | agree at some level    | 88,80%                | 77,30%          | 62,60%           |
| <b>4. Olive oil is essential in my diet</b> (Wilk's Lambda 0,514; Chi-squared p=0,031)                 | disagree at some level | 11,20%                | 18,10%          | 0%               |
|  | indifferent            | 21,10%                | 27,30%          | 0%               |
|  | agree at some level    | 67,60%                | 54,60%          | 100%             |
| <b>5. I choose olive oil for the type/size of packaging</b> (Wilk's Lambda 0,477; Chi-squared p=0,007) | disagree at some level | 12,70%                | 36,40%          | 56,30%           |
|  | indifferent            | 46,50%                | 31,80%          | 12,50%           |
|  | agree at some level    | 40,90%                | 31,80%          | 31,30%           |

Source: prepared by the authors.

As for the importance of packaging (variable 1) it was noticed that both the “utilitarian” and the “experts” consumers agreed on some level (81.7% and 81.3% respectively) that packaging is important for the choice of the products. On the other hand, the “naïve consumers” were less sensitive to this variable, since less than half (46.20%) agreed at some degree to it.

When asked whether the type and size of packaging influence at the time of purchase (variable 5), it was noted that this variable was less responsive to the “expert consumers” (56.3% disagreed on some level of the statement) and on the other hand was relatively more important to the “utilitarian consumers” (40.9% agreed on some level). The “naïve consumers” were very heterogeneous regarding this variable, indicating a lack of consensus on the importance and type of packaging at the time of purchase. Gathering the results of variable 1 and 5 it can be inferred that these elements (size and type of packaging) are at some extent consistent with olive oil market information in Brazil, since size and type of packaging are factors that influence consumers' purchase decision (ABRAS, 2016).

Regarding the importance of the price (variable 2) it was observed that this element was more significant for the “utilitarian consumers”, as 54.9% agreed on some level that the price is a determining factor in the choice of olive oils. The “expert consumers” were less price sensitive (37.5% agreed that the price is a determining factor in the purchase, 6.3% were indifferent and 56.3% disagreed) being possible to infer that this attribute is not a limiting factor for the choice of the product by these consumers. The “naïve consumers”, were in an intermediate position concerning this variable, the price might or might not influence their purchasing choices. In the Brazilian olive oil market information, it was observed that the majority of consumers belonging to classes A and B are not price sensitive (ABRAS, 2016). However, given the characteristics of the studied sample (class C) as well as the heterogeneity degree and the group segmentation performed, it was possible to notice in this study a certain degree of sensitivity by consumers in relation to olive oil prices.

Addressing the preference for olive oils from different countries (variable 3), it was observed that all groups agreed on some level with the statement, however, the “utilitarian” and “naïve” consumers showed more interest in the country diversification at the time of purchase (88.8% and 77.3% said they buy oil from different countries respectively), while the “expert consumers” proved slightly more conservative (62.2% agreed at some level). This is

an interesting fact in this study, because it contradicts the idea that, in theory, the “expert consumers” might be more interested in olive oil from different origins. There was, thus, a divergence from theory which shows that when the consumer is familiar with the product, the country of origin is very influential in the purchase decision (Jimenez-Guerrero *et al.*, 2012).

When asked about the importance of the olive oil in their diet (variable 4), 100% of the “expert consumers” claimed that the product is essential for them. However, the other groups were more dispersed, given that 67.6% of the “utilitarian consumers” agreed at some level with the statement and 54.6% of the “naïve consumers” also did so. It can be inferred that this general agreement level is probably linked to the expansion of the "Mediterranean diet" as a health factor around the world (Jimenez-Guerrero *et al.*, 2012), but although this relatively high agreement, many “utilitarian” and “naïve” consumers have in the consumption of olive oil, perceptions and interests different from the health factor. It can be inferred that many of these consumers use olive oil as a seasoning or as a substitute for traditional frying oil, thus the olive oil could be seen as a “supporting actor” and not as the “star of the show”.

In short, these results show a distinction among the groups, making it clear that the “utilitarian consumers” have some degree of knowledge and insight about olive oils but as the group name suggests, they use olive oils in their daily lives as a complement – a seasoning for salads or for frying foods – and end up neglecting some sensory and predictive aspects of the product. The “naïve consumers” showed a greater negligence towards the sensory aspects (preferring the GOA compound oil sample) and showed some agreement to the predictive aspects of olive oils. At last, the “expert consumers” showed in sensory terms convergent overall impressions for the olive oil samples and some divergence regarding aroma. In predictive terms these consumers showed homogeneously only for importance of olive oil in their diets and showed heterogeneity regarding the other attributes, which according to Roselli, Carlucci and De Gennaro (2016) this fact may represent specific characteristics of emerging markets.

## 6. Conclusions

This paper aimed at understanding ordinary consumer’s sensory perception and purchase intent of olive oil, considering Brazilian ordinary consumers’ perception. The study also had a distinctive feature by comparing traditional brands of olive oil with a Brazilian-made product (GEA sample). In general, it was observed that consumers showed coherent sensory perception towards olive oil characteristics distinguishing them from compound oil. This fact is an important contribution of this study, since it can be inferred that even consumers of a non-traditional olive oil markets have a certain degree of knowledge of its intrinsic attributes.

However, regarding purchase intent and preference, consumers displayed a mixed behavior pattern, that was not totally convergent to the sensory aspects. This empirical result is coherent with existing literature on this subject creating a multidimensional behavior. In other words, it is possible to say: consumers do not necessarily purchase or prefer the olive oil that they sensorially preferred.

Consumers’ behavior of olive oil also presented peculiar elements when they were segmented into groups. The groups (utilitarian, naïve and expert consumers) perceived sensory aspects in a very similar way to global amount of the surveyed consumers. Among the groups, it is important to highlight that the olive oil’s overall impression (EGO and GEA samples) and compound oil GOA were discriminant variables. Especially highlighting the GEA sample, it is possible to identify that it obtained satisfactory sensory perceptions among consumers, which can open market perspectives for the Brazilian product.

In terms of purchase intent and preference consumers displayed misleading perceptions. Since the compound oil presented a high degree of preference and purchase intent among consumers, it is important to shed some light to the fact that factors such as price could influence this kind of behavior (as demonstrated in discriminant analysis) since most consumers are characterized as “utilitarians”.

Considering only the olive oils samples (EGO, OAE and GEA) it was observed a relatively balanced consumers’ preference, the scores are closer to market position of the chosen brands, and GEA preference (20%) is very near to EGO’s, (21%) – second place in the Brazilian market. Another important issue is to provide more information in the market about olive oil’s healthy features, in order to increase awareness of its importance and also to boost the Brazilian market.

New studies on this subject could emphasize only the influence of olive oil samples in the analysis on consumers’ behavior and also investigate them in other places of consumption (like restaurants) as well different types of consumers (olive oil specialists or *chefs*).

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