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An investigation into Italian consumers' awareness, perception, knowledge of European Union quality certifications, and consumption of agri-food products carrying those certifications

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Abstract. The present study investigated Italian consumers' awareness, perception, knowledge of European Union (EU) quality certifications: Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), Traditional Specialty Guaranteed (TSG), and organic as well as the consumption of agri-food products carrying those certifications. A total of 212 consumers responsible for food purchases took part in a web-based survey between June and December 2019, inclusive. Descriptive statistics were calculated in relation to the data collected, followed by a factor analysis to reduce data dimensionality, and a cluster analysis on the latent variables generated, to identify similarities and differences among respondents. Awareness, perception, knowledge and consumption of agri-food products carrying EU quality labels has increased among consumers in recent years. The results related to the consumer's knowledge of quality-certified products showed that more than half of respondents were able to spontaneously quote examples of PDO (76%), PGI (56%) and organic food products (73%) while only 33% of participants could name at least one TSG product. The general awareness of the guarantees offered by PDO and PGI certifications was also assessed in relation to production processes, the natural and human factors of a particular environment and the reputation and quality of a particular region. Cluster analysis showed that consumers with the highest education were most likely to value EU quality certifications and support their local economies. The information obtained have practical implications for marketing and communication of European certified food products at national and international level.

Keywords: factor analysis, cluster analysis, food labels, knowledge evolution, European quality certifications.

1. INTRODUCTION

European quality certification was first introduced with Regulation (EEC) No 2081/92, which was subsequently repealed by Regulation (EC) No 510/2006, followed by Regulation (EU) No 1151/2012. Such regulations define three key labels of product quality, namely: Protected Designation of Origin (PDO), Protected Geographical Indication (PGI), and Traditional Speciality Guaranteed (TSG).

PDO are products originating in a specific place, region or in a country, whose quality or characteristics are essentially or exclusively due to a particular geographical environment with its inherent natural and human factors and whose all production steps take place in the defined geographical area.

PGI products are originating in a specific place, region or country, whose given quality, reputation or other characteristic is essentially attributable to its geographical origin and whose have at least one of the production steps taken place in the defined geographical area.

Finally, TSG are products or foodstuff that results from a mode of production, processing or composition corresponding to traditional practice for that product or foodstuff or is produced from raw materials or ingredients that are those traditionally used.

The main differences among them are related to the number of production steps that are involved in the defined geographical area, the raw materials used and the way the product is made. The quality policy aims to protect the names of specific products to promote their unique characteristics which are associated with their geographical origin, as well as their traditional know-how. The EU quality recognition enables consumers to trust and identify quality products while also helping producers to trade on the added value markets and avoid free riding. Moreover, these formal certifications help food products to be more competitive in the global market (Carbone, 2018).

The European Parliament and Council have also established quality certifications for organic agri-food products (Regulation (EU) No 2018/848). According to this regulation the organic products were developed to respond to a specific market in which consumers were demanding for products whose production's promotes environmental protection and animal welfare, maintains the biodiversity of Europe, contributes to rural development. The distribution of quality-certified products across Europe is not homogeneous, as more than 70% of the total products originate from only five countries, including Italy (21%), France (17%), Spain (14%), Portu-

gal (10%) and Greece (8%) (EU Commission, 2019). As for consumers perception of these products and their characteristics the distribution is varying (Profeta *et al.*, 2010). Indeed, Aprile and Gallina (2008) reported a level of awareness of 30% with regard to PDO, PGI and STG labels among Italian consumers, whereas Verbeke *et al.* (2012) observed that 23% of the Italian respondents were aware of the PDO certification, 38% were familiar with the PGI certification and 22% recognized the TSG certification. In Northern European countries, consumers' awareness of quality recognition is generally low (Jordana, 2000; Profeta *et al.*, 2010; Vanhonacker *et al.*, 2010) but is increasing, as these products seem to capture new segments on the market (European Commission, 2018).

In countries specialized in the production of quality-certified food, PDO/PGI labels are reported to be important and play a role in the consumers' decision-making process as well as on their willingness to pay, as these products have a favourable image (Scarpa and Del Giudice, 2004; van Ittersum *et al.*, 2007; Vecchio and Annunziata, 2011), however, other studies (Platania and Privitera, 2006; Grunert and Achmann, 2016) have reported evidence to the contrary. Although the PDO/PGI labels appeared to be important, Aprile *et al.* (2016) observed that only a small proportion of consumers was able to correctly associate PDO/PGI/organic farming characteristics to their respective labels. However, the organic farming label seemed to be more widely recognized among EU consumers, irrespective of their own national level of food quality specialization (European Commission, 2018).

The simultaneous investigation of perception, awareness, understanding, knowledge, decision-making and consumption of the European quality certifications was often hampered by the limited sample size, as well as the difficulty in retrieving information from the consumers' questionnaire. Indeed, many of the studies concentrated primarily on one aspect, with the majority focusing on the decision-making process, measured generally using the conjoint analysis (Krystallis and Ness, 2005; Mesias *et al.*, 2005; Capelli *et al.*, 2014). To the authors' knowledge, no research conducted among Italian consumers has ever attempted to determine all those aspects in one single study. Another important issue was the often limited geographical distribution of the sample of respondents collected, which was primarily restricted to the main cities or to certain provinces (Van der Lans *et al.*, 2001; Arfini and Pazzona, 2014; Ceschi *et al.*, 2018).

We focused our research on the last EU Regulation' (No 1151/2012) main objective ("to help producers of agricultural products and foodstuffs to communicate the

product characteristics and farming attributes of those products and foodstuffs to buyers and consumers”) and tried to study if this goal was reached, if this regulation can be considered a proper tool in communicating those food's attributes to consumers, or if EU should find a better suited solution. For our study' objective we considered consumers perception, awareness, knowledge, and consumption of the PDO/PGI/TSG being the best way to measure the regulation objective's accomplishment.

Given this, an overview of the past and current situation was required to understand whether there was any positive change in the consumers attitudes towards these certifications.

Confirmation of the existence of a real evolution will help prove the effectiveness and efficiency of PDO/PGI/TSG certifications as a marketing tool, therefore the EU Regulation (No 1151/2021) could be considered successful, reaching one of its main objectives.

New policies and communication efforts could be used to enhance consumers' curiosity in relation to products that are PDO/PG/TSG/organic certified.

2. MATERIAL AND METHODS

2.1 The survey

Between June and December 2019, a convenience sample made of 312 consumers across Italy replied to the web-based survey, formulated to conduct the current research. Of these, only 212 declared that they were responsible for the food purchases in the household, therefore, only these 212 consumers were invited to complete the whole questionnaire. The survey aimed to examine European quality certifications, to understand whether they were recognized by the consumers (awareness), whether the consumers perceive the guarantees offered by the PDO/PGI/TSG, Organic certifications (perception), approved their use (knowledge) and whether they played a role in consumers' buying decision process, thereby establishing whether these certifications truly had an impact on the purchasing decision (consumption). Another purpose of the questionnaire was to verify whether the market is stratified into different consumer categories with different attitudes towards the certifications, the final goal being to suggest different solutions for their promotion and valorisation. The questionnaire¹ was created in conjunction with the literature on consumer behaviour relating to typical foods and food labelling. Initially, a pilot test (n=20) was performed to ensure that the formulated questions were

clear and understandable for consumers. Should a question be regarded as unclear, this was revised and modified accordingly for the final questionnaire.

The final questionnaire was sub-divided into six sections, addressing specific issues as following:

i) the first section (one question) contained the filter question, as the survey was designed for those responsible for the food purchases for the family. The answer to this question was a dummy variable, indicating whether the respondent was (i.e.,1) or not (i.e., 0) responsible for the household food purchasing.

If the participant was not responsible for food purchases in the household, he/she would be redirected to the last section, where he/she would complete only the socio-demographic questions.

ii) the second section (4 questions) examined consumers' perception of food quality and safety, the importance of the EU quality certifications and other different food characteristics when choosing a food product, the significance of the food label and consumers' feelings towards food law compliance and different production types and techniques. Five-point Likert scale question were used in this section, with 1 corresponding to “Not at all” and 5 to “Very Important”.

iii) the third section (8 questions) covered consumers' awareness and knowledge of the EU quality certificates (PDO/PGI/TSG) and the organic certificate, attempting to identify the main differences between the PDO/PGI/TSG and organic products, and conventional products. In this section multiple image choice questions was used when respondents had to choose which of the shown logos they knew, and multiple choice questions when they had to select the right definitions of the EU quality certifications. Also, the previously used five-point Likert scale question was used (1= “Not at all” and 5= “Very Important”).

iv) the fourth section (12 questions) analysed consumers', knowledge and consumption of EU quality-certified products as well as organic products. Each of these quality labels was again analysed separately. Here three-point Likert scale questions were used (No=0, Yes=1, Maybe=2). In order to test their knowledge, the participants were asked to give some examples of each of these types of products. In addition, in order to establish their consumption of products bearing these certification they were asked for examples of the last PDO/PGI/TSG and organic products they had bought during the last three months. For this purpose, open-ended questions were used in all the above cases.

v) the fifth section (16 questions) consisted of an analysis of 16 Provolone Dolce cards, with different combinations of various characteristics, thereby collect-

¹ The questionnaire is available upon request.

ing the data needed for a conjoint analysis; however, this will not be considered further in the present study but will form part of an alternative ongoing project.

vi) the sixth section (10 questions) used demographic questions to cover the socio-demographic aspects of the respondents; the formulated questions evaluated the participants' city and area of residence, sex, age, number of family members, education level, job, civil status, and annual income.

The questionnaire was distributed online, and was shared on Facebook pages and groups, LinkedIn, WhatsApp, Messenger, as well as on certain cooking blogs. Therefore, the actual number of people viewing the survey is unknown, however, the total number of respondents is reported above.

2.2 Statistical analysis

Descriptive statistics were calculated in relation to the data collected between the second and the sixth sections of results, using a basic script in Python (Python Software Foundation, ver. 3.6). The software IBM SPSS Statistics (ver. 24.0, IBM Corp., Armonk, NY) was employed to conduct multivariate statistical analysis within a multiple-step framework. In the first step, we carried out a factorial analysis in order to reduce the dimensionality of the data collected into a smaller set of key factors, that would be easier to explain. The variables covered in the analysis focused on different food characteristics at the point of purchase, the importance of different safety and quality food characteristics, attitudes towards EU quality-certified products, the perception of law compliance, production types and techniques, as well as the attention given to various information on the label. A 5-point Likert scale was used to measure all the variables included in the factor analysis. The optimal number of latent variables selected for the subsequent analyses was chosen, based on the lowest number of components with associated eigenvalues greater than 1 (Kaiser, 1960) and based on the proportion of the total variance explained by the retained factors of at least 50%. In the second step, a cluster analysis was applied to the latent variables previously generated and selected with the aim of organizing the respondents into homogenous groups. Prior to the cluster analysis, data were processed with the agglomerative hierarchical procedure. According to Ward's criterion of aggregation, 10 iterations with mobile centres were completed. Based on a visual inspection of the generated dendrogram, the optimal number of clusters to specify in the K-means method was set at 4. This type of analysis applied Euclidean distance to define similarities and differences within the clusters.

3. RESULTS AND DISCUSSION

3.1 Description of the sample

The results reporting the socio-demographic aspects of the sample used in the present study, are depicted in Table 1.

The sample analysed in the present study may not be completely representative of the Italian population as the criteria that was used for the sampling is convenience. There is an over-representation of women and younger respondents, with 48% of the sample aged between 18 and 35 years old, that may be because the questionnaire was distributed online, and the population tends to not have access to the Internet or computer skills. 64% of the respondents were women and this over-representation can be explained by the fact that our respondents needed to be responsible for the food purchases in their household, and women, generally, have that responsibility.

More than 70% of the respondents had at least a bachelor's degree, with 11% having a PhD. Having this highly-educated sample can be explained by the method used to administer the questionnaire. Moreover, the North-Eastern region of the country is also overrepresented (52%). This can be explained as the questionnaire was disseminated with the social network of the authors, so it may have inflated the number of respondents from a limited geographical area.

The most popular occupations were office worker (37%), freelancer (14%), student (14%) and housewife (8%). The 17% declared an annual income less than 10,000 € while 12% declared an income greater than 40,000 €. The non-representativeness of our sample might have some influence on the final results. For example, the women over-representation could have generated greater results, as found by Dekhili et al. (2011), or contrary could have shown lower ones as sometimes men presented better knowledge of these certifications (Verbeke et al., 2012). These both same studies shown that older groups of people have a higher awareness and use of the EU quality certifications. As in our sample the older groups were underrepresented (45-70 years old) we believe this could result in lower outcomes. Having a higher educated sample might have introduced some bias as it is expected that the higher the education level, the higher the knowledge resulting in a more positive attitude towards these certifications.

3.2 Awareness and knowledge of European quality certifications

In the third section of the questionnaire (awareness and knowledge) the consumers were shown four

Table 1. Socio-demographic distribution of the collected sample by comparison with the Italian population.

Variable	Levels	Frequency (%)	Population (%)
Age (in years)	18-25	9	10
	26-35	39	16
	36-45	22	20
	46-55	17	24
	56-70	13	30
Gender	Female	64	51
	Male	36	49
	No education/Elementary school	0	17
Education	Junior high school qualification	3	32
	High school qualification	27	36
	Bachelor's degree/ Master's degree/Post graduate training/PhD	70	15
Civil status	Single	57	42
	Married	39	47
	Divorced	2	3
	In a relationship	1	
	Separated	1	
Family members	1	17	33
	2	28	27
	3-4	42	35
	>4	13	5
Geographical Distribution	North East	51	19
	North West	19	27
	South	12	23
	Centre	11	20
	Islands	7	11
Occupation	Office worker	37	
	Freelance	14	
	Student/PhD student	14	
	Housewife	8	
	Teacher	4	
	Research/Academia jobs	4	
	Unemployed	5	
	Worker	3.5	
	Retired	1.0	
	Jobseeker	1.5	
	Entrepreneur	3.0	
	Food related jobs (chefs/food bloggers)	1.0	
	Other	4	
Average annual income (€)	< 10,000	17	
	10,000 – 20,000	38	
	20,000 – 40,000	33	
	40,000 – 50,000	5	
	> 50,000	7	
Area of origin	Rural	30%	
	Urban	70%	

* Istat (National Statistics Institute) data extracted in November 2019.

EU quality logos, PDO, PGI, TSG and organic farming logos and were asked to select those that they were aware of. The results indicated that the logo people were more aware of was the PGI, selected by 82% of respondents, followed by the PDO (76%) and the organic logo (68%), while people were least aware of the TSG with only 34% of them. 25% of the respondents declared that they were aware of all four logos, 30% were aware of three logos, 25% of two logos and 20%, just of one logo (Appendix, Figure 1). These findings were higher than those reported in a study by Aprile and Galina (2008) in which the PDO, PGI, TSG and organic mark were recognized by 30%, 16%, 3.5% and 41% of the interviewees, respectively. Arfini (1999) demonstrated that 41.8% of Italian consumers were aware of the presence of a PDO-labelled food product in the food market. Similar results were found in a later study by Platania and Privitera (2006) that assessed the consumer appraisal of the Italian PDO Soppressata salami, which reported that 42% of Italian consumers were aware of the PDO label. As explained in the review conducted by Grunert and Aachmann (2016), and identified in the present study, the higher degree of consumer awareness of European quality labels depended on the time period in which the study was undertaken.

To further investigate the self-declared awareness and consumption of the EU quality certifications, participants were then asked how well they knew the certified products and how often they bought them. The PDO certified products were bought most frequently, with 68% declaring that they regularly (18%) and sometimes (50%) purchased them. Conversely, TSG products were bought least often (4% regularly and 16% sometimes; Appendix, Table 1).

Respondents were then presented with six official definitions extracted from Regulation (EU) No. 1151/2012 and had to choose for each of them the corresponding EU certification (PDO, PGI, TSG or none).

For both statements that defined the PDO's out of all respondents 42% were able to identify correctly the one that refers to "the production steps of which all take place in the defined geographical area" and 43% "whose quality or characteristics are essentially or exclusively due to a particular geographical environment with its inherent natural and human factors". (Appendix, Figure 2)

For the PGI defining statements, the one describing the production steps, was correctly identified by 55%, but only 38% did so for the statement explaining that the quality and reputation are given by the geographical origin.

As for the TSG statements, in both cases almost half of the respondents identified the right statements: 46% explaining "the traditional production, processing, and composition for that products" and 49% for the state-

ment related to the raw materials and ingredients traditionally used, for at least 30 years.

Data from Table 2 show the mean and the standard deviations of the elements that consumers used to distinguish the certified products from the conventional products.

The "place of the origin" mean was the highest in the case of PDO (4.64), PGI (4.49), TSG (3.73), followed by the "EU quality logo" (PDO 4.29, PGI 4.21, TSG 3.61) which was seen as the most important characteristic for the organically-certified products (4.18), followed by "price" (4.01). The less relevant features were "brand" and "point of purchase" for all four certifications. In accordance with these data, other studies (Contini *et*

Table 2. Means and Standard Deviation of the different attributes distinguishing between EU quality-certified products and conventional products.

EU certification	Attribute	Mean	Standard Deviation
PDO	Price	4.01	0.76
	Brand (National Brand/Private Labels)	3.62	0.91
	EU quality logo	4.29	0.78
	Appearance	4.00	0.89
	Place of origin	4.64	0.53
	Point of purchase	3.44	0.98
PGI	Price	3.91	0.90
	Brand (National Brand/Private Labels)	3.52	1.00
	EU quality logo	4.21	0.93
	Appearance	3.94	1.00
	Place of origin	4.49	0.77
	Point of purchase	3.46	1.12
TSG	Price	3.43	1.56
	Brand (National Brand/Private Labels)	3.07	1.46
	EU quality logo	3.61	1.62
	Appearance	3.37	1.58
	Place of origin	3.73	1.69
	Point of purchase	3.08	1.60
Organic	Price	4.01	1.05
	Brand (National Brand/Private Labels)	3.48	1.10
	EU quality logo	4.18	1.03
	Appearance	3.86	1.12
	Place of origin	3.91	1.24
	Point of purchase	3.36	1.24

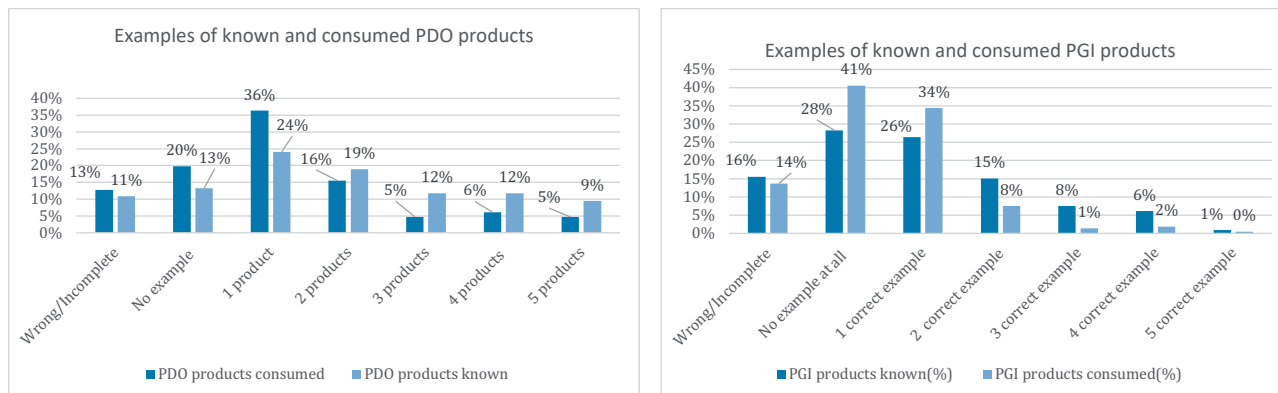


Figure 1. Examples of known and bought PDO and PGI products.

al., 2016; Vanhonacker et al., 2010b) revealed that “place of origin” was the most important attribute in distinguishing and choosing between European quality-certified products and conventional products. The choice of “price” as a distinguishing element for quality-certified products can be viewed as a signal of a high-quality product, as confirmed by previous studies conducted by Grunert et al. (2000) and Verberke et al. (2007) Santeramo (2020) suggested that adding regional certification labels (e.g., Protected Designation of Origin–PDO, Protected Geographical Indication–PGI, American Viticultural Area–AVA) or regional information increases consumers’ confidence on the product quality.

3.3 Knowledge and consumption of the European quality certifications

Results reporting the opinions of respondents in relation to the food safety of European quality-certified products are detailed in Table 3. Food safety was used in this section as a way to study consumer’s knowledge of EU quality certifications as those products are believed to have a higher level of food safety.

Table 3. Consumers’ perception of the safety of EU quality-certified products.

	In your opinion, are EU quality-certified products safer than other products?		
	Yes	No	I do not know
PDO products	58%	22%	20%
PGI products	50%	26%	24%
TSG products	25%	25%	50%
Organic products	39%	40%	21%

When respondents were asked whether they considered the PDO certified products safer than conventional products, 58% of the respondents replied “yes” and 22% “no”, while 20% responded “I don’t know”. Similar results were recorded with regard to the PGI certified products, with 50% choosing “yes”, 26% “no” and 24% “I don’t know”. Organic farming products registered the highest percentage for “no” with 40%, with only 39% replying “yes”. In relation to TSG products, 50% of the respondents declared they “didn’t know” if they were safer or not, while 25% replied “yes” and 25% answered “no”.

Figure 1 reveals evidence of the consumers’ actual knowledge of quality-certified products, as they were asked if they could name any PDO, PGI, TSG or organic products, without being prompted.

The results show that in relation to PDO products, over 11% of the sample provided an incorrect answer, around 13% were unable to recall any PDO products, 24% gave one example, 19% two examples, 12% three or four examples, and 9% five examples. As for the PGI products, over 16% of the individuals provided an incorrect answer, around 28% were not able to quote any example, 26% gave one example, 15% two examples, 8% three examples, 6% four examples and 1% five examples.

With regards to TSG products, 13% of respondents gave an incorrect answer, 55% were unable to cite any TSG product, 25% remembered one example, while 7% provided two which is the maximum of right examples possible in Italy. 27% of participants were unable to recall any organic products and 73% provided one or more organic food examples.

In relation to the organic product results, de Magistris and Gracia (2012) showed that more than 50% of consumers declare to be a habitual buyer of organic food products and around 59% of Italian consumers state that

“probably yes” or “definitely yes”, they pay attention to organic label when shopping organic food products.

These results are in accordance with the self-assessed knowledge relating to logos (discussed above in the “awareness and knowledge of European quality certifications” section) except in the evaluation of the PGI products, in which the degree of self-assessed knowledge was higher than the actual knowledge with a frequency of 26%. The results in these findings are higher than those in previous studies like Vecchio and Annunziata (2011) who considered PDO/PGI products together and revealed that over 37% of the respondents gave an incorrect answer, around 29% were unable to recall any PDO or PGI food, 20% gave less than two names and 14% less than four. Examining the category to which the examples provided belong, it was observed that in the case of the PDO products, the correctly cited products belonged to the cheese category, the meat products category (cooked, salted, smoked), the fresh or processed category (fruit, vegetables, cereals) and finally the oils and fat category, with figures of 60%, 18%, 3% and 1%, respectively.

In the case of the PGI products, 34% of the correct examples were associated with the meat products category (cooked, salted, smoked), the fresh or processed category (fruit, vegetables, cereals) recorded 26%, closely followed by vinegar at 24% (category known as “other products”). The results correspond to the consumption value of Italian PDOs and PGIs in which cheese and prepared meats account for 84% of its total sales (ISMEA, 2018).

Regarding these findings Santeramo and Lamonaca (2020), found that Geographical Labels are effective differentiation tool although their relevance varies across products and origins. For instance, GL is the main differentiation tool for wine, but it is of low relevance for low-prices products and in different national markets. Costanigro et al. (2010) sustains the same results as to the less expensive products, showing that the consumer may not see the value (in terms of search costs) in critically differentiating across many individual producers when buying less expensive products (such as grains, fruits and vegetables) but affirms the contrary when it comes to purchasing more expensive products (such as wine and olive oil), as the incentive to learn about differences in quality across brand names is more pronounced, allowing brand names to capture a larger share of the reputation premium.

To determine the consumers’ actual use of EU quality certifications and their accurate consumption, respondents were asked to recall from the previously given examples which products they had purchased during the last three months (Figure 3). In relation to

the PDO certification, 13% of the individuals returned an incorrect answer, 20% were not able to provide any example, 36% indicated one example, 16% two examples, 5% three examples, 6% four examples and 5% five examples. In the case of the PGI certification, incorrect or incomplete examples were provided by 14% of the respondents and 41% gave no example at all. Of the correct examples, 34% provided one, 8% gave two, 1% three, 2% four and none (0%) of the participants provided five correct examples. As for the organically certified products, 44% of the respondents provided no example at all, while 56% gave one or more examples.

Aprile and Gallina (2008) showed the interviewees a list of nine products, from each category considered; all products were PDO or PGI certified and respondents were asked to choose those that they purchased more frequently. The more frequent categories were the cheese category, meat products category (cooked, salted, smoked), fruit and vegetables. Their findings were very similar to ours.

It has been observed that some of the products that appeared in the study of Aprile and Gallina (2008) are not mentioned by our respondents, however, certain new names were mentioned. Another difference is the higher percentage found in the comparable study, but this is due to the fact that their respondents selected names from a given list, while our respondents gave the examples spontaneously, without any help or suggestion.

Our descriptive analysis showed that consumers were asked to provide examples of EU quality-certified products; in most cases, the responses provided contained at least one well-known food on the national market (e.g., Parmigiano Reggiano, Mozzarella di Bufala Campana, Gorgonzola, Grana Padano) but their answers were not limited to these. Related to these findings, Deselnicu et al. (2013) revealed that the institutional framework for the Geographical Indications was found to matter: within the same country, quality assurance certifications with higher quality standards (such as PDO) receive higher premiums than less stringent ones (such as PGI). Moreover, when multiple labelling certifications with different minimum quality standard coexist (as for PDOs and PGIs in Europe), the price premium associated with the labels is lower than when a single label is used (as for the GI trademark in the United States). Leufkens (2018) tried to prove the positive value of a GI quality signal (i.e. label) by quantifying its monetary value for the consumers and found that consumers are willing to pay a marginal premium for the GI, by an average of 11.5 percent, while the PDO alone achieves an LE of 13.6 and a PGI of 6.2 percent.

3.4 Perception, attitudes towards quality food products and purchasing habits

In relation to the questions in the second section (Appendix, Table 2), different characteristics were listed, and respondents had to evaluate them using a 5-point Likert scale. With regard to the various aspects that consumers recognized as “very important” and “relatively important” in their food purchasing process, the most important was hygiene standards (97%), followed by price (92%), appearance (88%), nutritional value (77%) and PDO certification (75%). The aspects that were seen as less important, registering the highest percentage of the options “indifferent”, “not much” and “not at all” were TSG certifications (65%), organic certifications (51%), brand (38%) and PGI certifications (33%).

When asked about the characteristics of a safe and quality product, the absence of undesirable chemicals and microorganisms was evaluated as “very” and “relatively important” (98%), followed by compliance with national and European laws relating to food and the environmental area (96%), controlled and certified production sites (89%), products that satisfy the senses, are well prepared and preserved (89%), country of origin (86%), sustainable production techniques (80%) and PDO certification (74%). The lowest scores on the Likert scale (“indifferent”, “not much” and “not at all”) were again recorded in relation to TSG certification (59%), popular brand (58%) and organic certification (47%).

With reference to the various information found on the product label, the components considered to be “very” and “relatively important” were expiry and use-by date (94%), ingredients (92%) and information relating to the producer and place of production (89%), while 23% regarded nutritional characteristics as being “indifferent”, “not much” and “not at all important”.

The last question in this section revealed that 88% of the respondents claimed to purchase Italian food whenever they could, 74% claimed to be very proud of the PDO, PGI and TSG products produced in their area, municipality or country. However, only 67% felt that they were supporting local farmers when they bought PDO, PGI and TSG products. As for the affirmation that PDO, PGI and TSG trademark products are too expensive, 40% either agreed or completely agreed, 39% disagreed or completely disagreed, while 21% were neutral. Similar to our findings Deselnicu et al. (2013) shown that stricter regulations may signal increased benefits to consumers in the form of food safety, quality assurance, and stronger cultural or heritage connection, prompting a higher willingness to pay for products that are more closely regulated. Also, more stringent regulations for the PDO designation appear to secure a higher price

premium than its less stringent quality-assurance counterpart (PGI).

3.5 Exploratory factor analysis (EFA)

A series of exploratory factor analyses (EFA) were conducted using the questions and affirmations from the survey's second section. Before we carried out the EFA, the values of the bivariate correlation matrix of all items were analysed, and where the bivariate correlation scores were greater than 0.8, one of the pair's items was removed, as suggested by Field (2013). Additionally, the multicollinearity was tested via the determinant of the matrix, whose value of 0.1 exceeded the minimal value of 0.00001. Furthermore, our factor model Kaiser-Meyer-Olkin's measure of 0.820 proved the adequacy of the sample size. Bartlett's test of Sphericity was significant ($P < 0.001$). The Varimax rotation method was employed and the eigenvalues greater than 1 were established as borderlines for the factors extracted.

The analyses eventually resulted in the selection of a six-component solution, based on 24 of the 27 initial variables. The six extracted components accounted for 56.32% of the total variance in the data, respecting the rule of at least 50% (Streiner, 1994).

Items in this six-component solution were regarded as high and moderately high, loading higher than 0.400 on each component (Kleine, 2014). Their Cronbach's alpha reliability tests showed increased reliability, with values higher than 0.60 (up to 0.79).

Table 4 contains the components resulted from the factorial analysis. The first component “Product composition and characteristics” comprised variables such as nutritional and organoleptic characteristics, ingredients and label information.

The second component “Product origin” describe, as the name suggests, the importance given to the origin of the product and of the raw materials producer's information, as well consumers' pride in buying EU quality-certified food that is locally produced. The third component “EU quality certifications” describes the importance consumers attach to the European quality certifications (PDO/PGI/TSG) and how buying EU certified food supports local farmers. The fourth component “Product visual presentation relates to the value attributed by consumers to the products appearance and appeal and the expiry date. The fifth component “product law and hygienic compliance” examined the significance of hygiene standards, law compliance, absence of unwanted chemicals and controlled and certified production sites in consumers' food choices.

The sixth component “Product price and brand” considered the impact that price and popular brand had

Table 4. Factor analysis on the components associated with respondents' purchasing intent.

Items	Components					
	Product' composition and characteristics	Product' origin	EU quality certifications	Product' visual presentation	Product law and hygienic compliance	Product price and brand
Nutritional characteristics	0.746					
Ingredients	0.639					
SustProd techniques	0.595					
Label information	0.556					
Producers' experience	0.540					
Biological mark (Organic)	0.526					
Organoleptic characteristics	0.525					
Country of origin		0.786				
Frequency of buying		0.728				
Local raw materials		0.629				
Pride EU marks		0.546				
Producer information		0.519				
PDO trademark			0.713			
TSG trademark			0.604			
Support for local production			0.476			
Appeal, conservation				0.788		
Food aspect				0.779		
Expiry date				0.612		
Absence of UW chemicals					0.733	
Law compliance					0.725	
Hygiene standards					0.577	
CC Production sites					0.431	
Cost, expensiveness of EU trademarks						0.790
Popularity, brand						0.592
Explained variance, %	24.942	9.315	6.807	5.972	4.985	4.295
Cumulative variance, %	24.942	34.257	41.064	47.036	52.020	56.315

*The items are ordered by dimension, and the small coefficients with an absolute value below 0.300 have been eliminated.

on consumer choices. The six components that were obtained using the factor analysis were then used as variables in a cluster analysis that divided our sample into four groups, with maximized homogeneity within the individual groups and minimized between them.

Table 5 presents a detailed representation of the socio-demographic characteristics of the four clusters.

3.6 The socio-demographic characteristics of the four clusters

From a socio-demographic perspective, the first cluster is defined as the most gender-balanced (47% men and 53% women), predominantly from urban areas (73%) with the highest concentration of young consumers, as 83% were aged between 18 and 45 years. This group had the highest proportion of one member fami-

lies (27%), with 53% earning at least 20,000 €/year (12% of these > 40,000 €/year). The respondents' occupations were from research and academia (4%), entrepreneurs (5%), students/PhD (16%) and retired people (4% the only cluster in which this group was represented).

The second cluster had the highest percentage of primary school graduates together with the highest percentage of unemployed people (10%) and office workers (65%) but also the lowest number of freelancers (5%). In this cluster none of the participants earned more than 40,000 €/year, half of the participants were made up of families with three to four members and a quarter had four members or more.

The third cluster is characterized by an urban population, consisting predominantly of women (74%), characterizes this group, with more than 40% being over 45

Table 5. Socio-demographic distribution among clusters.

Variables	Level	Cluster 1 "visual presentation enthusiasts"	Cluster 2 "origin enthusiasts"	Cluster 3 "food provenance and image enthusiasts"	Cluster 4 "food regulations enthusiasts"
Area of origin	Rural	27%	40%	27%	33%
	Urban	73%	60%	73%	67%
Gender	Male	47%	60%	26%	39%
	Female	53%	40%	74%	61%
Age	18-25	6%	20%	11%	3%
	26-35	55%	40%	26%	58%
	36-45	22%	20%	23%	21%
	46-55	10%	15%	27%	3%
	56-70	7%	5%	13%	15%
Number of family members	1	27%	10%	11%	24%
	2	35%	15%	24%	43%
	3-4	35%	50%	50%	24%
	>4	3%	25%	15%	9%
Education	No title	0%	0%	0%	0%
	Elementary or middle school	2%	10%	1%	0%
	High school	18%	15%	35%	18%
	Bachelor or master's degree/PhD	80%	75%	64%	82%
Civil Status	Single	65%	65%	48%	67%
	Married/In a domestic relationship	35%	35%	47%	30%
	Divorced/ Separated	0%	0%	5%	3%
Average annual income	<10,000 €	12%	25%	15%	24%
	10,000-20,000 €	20%	40%	39%	45%
	20,000-40,000 €	41%	35%	33%	21%
	40,000-50,000 €	4%	0%	6%	3%
	>50,000 €	8%	0%	7%	6%
Occupation	Homemaker / Housewife	8%	5%	8%	6%
	Unemployed	6%	10%	1%	0%
	Office worker	37%	65%	31%	45%
	School teacher	2%	0%	4%	6%
	Freelancer	14%	5%	15%	15%
	Worker	4%	0%	5%	0%
	Retired	4%	0%	0%	0%
	Research/Academia Jobs	4%	0%	9	12
	Student/PhD student	16	10	18	6
	Entrepreneur	5%	0%	5%	0%
	Food related jobs(blogger/chef)	0%	0%	3%	3
	Job seeker	0%	0%	2%	6%
	Others	0%	5	4	1

years old; the highest number of high school only graduates were found in this group (35%) and single (48%) and married (47%) people were equally represented. It was the most diversified group in terms of occupation (teachers, food related workers, researchers, workers, freelancers, office workers).

The fourth cluster consisted of single individuals with a high standard of education (> 82% had at least a bachelor's degree) and low annual income, as 69% earned less than 20,000 €/year; this cluster comprised primarily office workers, research workers, housewives and freelancers.

3.7 The clusters attitudes towards the analysed variables

As regards to the considered variables (Table 6), first cluster "visual presentation enthusiasts" is characterized by respondents that pay most attention to appeal, appearance, and availability. They also considered law compliance and the healthiness of the product as particularly important in their food choice. This group recorded the lowest interest in producer's information, origin of raw materials and of the product. In addition, EU quality certifications and support for local economies were insignificant to this group.

By comparison with the first cluster, the second cluster "origin enthusiasts" valued most the producer's information and the origin of raw materials and of the product. This cluster recognized extrinsic characteristics (price, brand) as decisive. Law compliance and the healthiness of the product were less important elements for this group. Organoleptic, nutritional and sustainability characteristics were also regarded as insignificant.

The third cluster "food provenance and image enthusiasts" was the only cluster that valued all the components positively (Table 6), demonstrating a great interest in producer's information, origin of raw materials and of the product, as well as appeal, appearance, and availability.

Of all the clusters, the last cluster "food regulations enthusiasts" attributed the highest value to law compliance and the healthiness of the product. EU quality certifications and support for local economies, as well as producer's information and the origin of raw materials and of the product, were essential elements of this group's components.

4. CONCLUSIONS AND RECCOMENDATIONS

Our results outlined that the level of perception, awareness, knowledge and consumption of EU quality

labels has increased considerably among Italian consumers in recent years.

With respect to geographical indications, a widespread awareness of the guarantees offered by the PDO and PGI marks in relation to production steps, the natural and human factors of a particular environment and the reputation and quality of a region were assessed. As for the traditional specialties (TSG) an extensive knowledge regarding the traditional practices of production, process and composition, as well as ingredients and raw materials was identified. New policy and communication efforts could be used by the consortia to enhance consumers' curiosity towards products that are PDO/PG/TSG or organic certified.

Our results allow us to formulate some suggestions for the policy makers as well as for the Consortia and the producers of the PDO/PGI/TSG/Organic products. Seeing that our consumers were divided in four clusters we assume that even at the national/international level there is heterogeneity as regards to these labels, therefore for each of the cluster we propose some communication strategy.

For the "Visual presentation enthusiast" cluster, the strategy adopted should concentrate more on the way these products are presented, using attractive packaging but also one that helps reflect the look of the products.

For the "Origin enthusiasts" the message of the communication campaign should point out how these products are unique in the sense of the typicity that is given by the particular geographical areas where they are produce and by the raw materials they are made of, strengthening the importance that these two elements have on the final product.

As to the "Food provenance and image enthusiasts" cluster considering their positive attitude towards all the quality certified foods' attributes, we believe that the message the policy makers as well as the producers and Consortia should sponsor and publicize, is one

Table 6. Final Cluster Centres.

	Cluster			
	1 "visual presentation enthusiasts" (8%)	2 "origin enthusiasts" (53%)	3 "food provenance and image enthusiasts" (11%)	4 "food regulations enthusiasts" (28%)
Product' composition and characteristics	-0.389	-0.443	0.242	0.039
Product' origin	-1.267	0.300	0.471	0.130
EU quality certifications	-0.417	-0.086	0.171	0.101
Product visual presentation	0.309	-0.109	0.344	-1.541
Product law compliance	0.126	-2.387	0.289	0.295
Product price and brand	-0.208	0.113	0.238	-0.555

that could produce some ethical and altruistic motives, therefore the message must stress out the support these products bring to the local economy in the area in terms of jobs and income.

The "Food regulations enthusiasts" could be conquered by campaigns that point out how these quality products follow very strict production rules, with regular checks on healthiness, sanitary and organoleptic elements, and that this is one of the elements that differentiate them from the conventional products that might have more relaxed rules and less controls.

One limitation of the present study is the fact that the sample is not strictly statistically-representative of the Italian population. The sample is biased towards relatively younger and highly educated shoppers and female consumers. Therefore, additional qualitative and quantitative research needs to be done with a larger and representative sample, to extend the legitimacy of the findings and to generalize the results to represent the national population. Another possible limitation of the study, is that since the questionnaire was our investigation instrument there might have been a certain predisposition to socially desirable responding, or as Martin and Nagao (1989) better described it, a tendency to give answers that make the respondent look good, or the tendency "to stretch the truth in an effort to make a good impression".

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Table 1. Self-declared knowledge and frequency of buying of the EU quality certifications.

Certifications	I regularly buy them	I know and I buy them sometimes	I know them	I don't know them
PDO certified	18%	50%	27%	5%
PGI certified	15%	48%	30%	8%
TSG certified	4%	16%	24%	57%
Organic certified	12%	43%	38%	7%

Table 2. Importance of different attributes when food shopping.

	Very important	Pretty important	Indifferent	Not much	Not at all important
Hygienic Standards	78%	19%	2%	0%	
Brand	6%	56%	25%	9%	4%
PDO certification	19%	56%	17%	7%	2%
Appearance	46%	42%	7%	3%	1%
PGI certification	15%	52%	22%	9%	2%
Price	39%	53%	6%	2%	0%
Nutritional Values	35%	42%	18%	2%	3%
Organic certification	12%	37%	27%	14%	10%
TSG certification	5%	30%	38%	12%	15%

APPENDIX

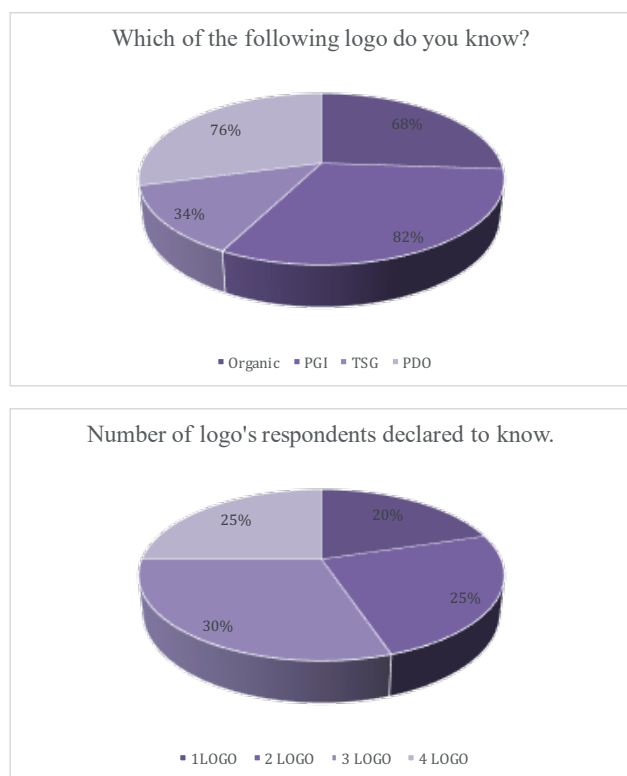


Figure 1. Self-declared knowledge of the EU quality certifications logos

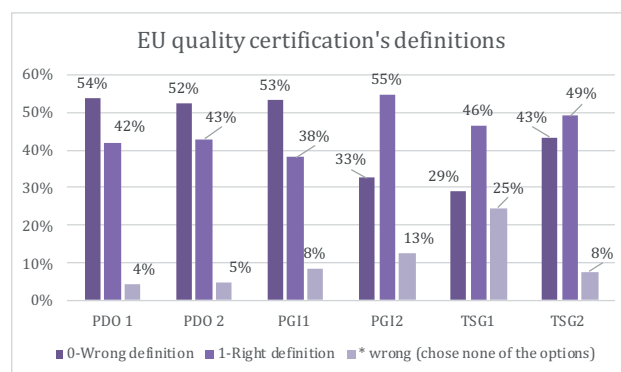


Figure 2. EU quality certifications definitions.