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Attitudes of Maltese Consumers Towards Quality in Fruit and Vegetables in Relation to Their Food-Related Lifestyles[1]

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Abstract

Consumers' interest in quality aspects of food products has significantly increased. The objective of this study is to examine the influence that Maltese consumers' lifestyles have on their attitudes towards quality features of fruit and vegetables. To achieve our objective we used the Food-Related Lifestyle approach and carried out a telephone survey during February 2010 in Malta. Consumer profiles were identified through segmentation analysis, taking into account five aspects: (i) subjectivity of quality; (ii) consumer difference; (iii) intangible dimensions; (iv) information environment; (v) and price.

Keywords: food-related lifestyles approach, fruits and vegetables, consumers' attitudes, food quality, Maltese consumers

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Introduction

The European Union promotes consumption of fresh fruit and vegetables because of their healthy properties (CBI 2009). One example of this is the European Commission's recent White Paper on Nutrition, overweightness, and obesity-related health issues, which seeks to promote greater fruit and vegetable consumption as one of a number of initiatives aimed at improving public health, particularly the prevention of chronic diseases such as heart disease, cancer, type 2 diabetes and obesity (Eurostat 2008). Thus, fruit and vegetable consumption is encouraged as part of a healthy diet that will result in lower personal and social health costs (Gao et al. 2011). This trend has led to fruit and vegetable growers having to to deal with increasing demand for their products and demands on their production system (EU Report 2006), which has been met by intensifying production, improving logistical techniques, and increasing imports. Moreover, they have also been obliged to allay consumers' concerns regarding quality and safety aspects in the fruit and vegetable sectors, which go hand in hand with consumers' awareness of the relationship between production practices and quality (Kuhar and Juvančič 2010). Thus, quality and quantity features are the two factors driving the current European market supply of fruit and vegetables. Currently, the demand for traceable products and reliable suppliers is growing and the need for food safety and product quality is widely acknowledged by the European Union, the food industry and consumers. In this context, the European Union has introduced a series of quality requirements aimed at regulating the production of fruit and vegetables and protecting the consumer. However, the capacity of the food industry to translate these needs into practical and controllable measures is a critical factor in achieving success in a competitive agricultural sector. Finally, consumers, with their preference for quality attributes and differentiated food products, have become key players.

The main motivation of this study is to promote fruit and vegetable consumption in Malta and the need to develop a strategy for the value-enhancement of local fruit and vegetable production in the Maltese market.

The Maltese market absorbs, on average, 100,000 tonnes per year of fresh fruit and vegetables, with a per capita consumption of 375 grams/day of fruit and 600 grams/day of vegetables. In 2008 Maltese farmers produced 80,000 tonnes of fruit and vegetables, covering 80% of the total supply; the rest was imported from the European Union Single Market and from third countries. Maltese farmers produce fruit and vegetables which are then sold in Malta and which, therefore, do not travel long distances to get 'from farm to table'. This means that nowadays the product purchased by consumers is usually fresh and there is a minimal loss of vitamins through lengthy storage or exposure to heat. Shorter distances also result in less energy use and less pollution created due to transportation. No need for storage means that chemicals for keeping the produce fresh for weeks or months are not used. However, with the increase in imports of price-competitive and service-richer produce, the advantage enjoyed by small-scale farmers is disappearing and problems of sustainability are increasing. Although fiercer international competition has resulted in a loss of market share, it may also represent a value-enhancement opportunity for local producers who are struggling to compete in the global marketplace. Local food supply to the Maltese fruit and vegetable market may represent an alternative to a globalized system and may provide a number of benefits which could prove relevant to consumers, such as a reduction in transportation, energy use and carbon emissions, as well as enhanced local rural development.

Thus, local production is associated to a mix of private and public benefits that in most cases refer to credence attributes. In a competitive market, goods with credence attributes are affected by the well-known problems of asymmetric information and moral hazard. One way to tackle this problem is with the creation of a certification scheme which guarantees the quality level of credence attributes to those consumers who are willing to pay a premium for these attributes. Identifying groups of consumers who would be more oriented towards purchasing local produce, when it is identified as such, is one of the first steps towards value-enhancing the localness attribute and the benefits it provides. Thus, analysis of Maltese consumers' attitudes towards quality in fruit and vegetables may play a crucial role in determining strategies for enhancing the particular features of the local Maltese market. Adopting a marketing-oriented approach may be a useful competitive strategy, one which is necessary in most of today's consumer goods markets. At the same time, in a highly competitive global marketplace an increasingly driving customer demand for quality is being encountered (Kontogeorgos and Semos 2008). In this context, the importance of these studies in guiding the development of consumer-oriented strategies is paramount (Karagianni, et al. 2003).

Over the last few decades, a large number of consumer studies have been conducted which have revealed and measured consumers' preferences, perceptions and attitudes towards such quality aspects of food products as origin, production method, traceability, etc. Regarding fruit and vegetables as products of interest, most of the research done in this area has aimed at investigating consumers' purchasing behavior and their perception of quality in fruit and vegetables. For example, Kuhar and Juvančič (2010), conducted a country-wide survey to investigate consumer purchasing behavior regarding organic and integrated fruit and vegetable products in Slovenia. Using an ordered probit model, they showed that the purchase of the analyzed categories is mainly influenced in a significant way by their availability on the retail market, this is followed by income, health, environmental considerations and the produce's visual attractiveness. While, Poole and Martinez-Carrasco (2007), employing a second price Vickrey experimental auction method, tested consumer perceptions of fruit quality by evaluating consumers' willingness to pay (WTP) for five different varieties of soft citrus fruit under three different information conditions: visual inspection of the fruit before peeling; visual inspection after peeling; and after consumption. They found significant differences in consumers' valuation of the different varieties as they gained more information. Juiciness, sweetness and acidity were the attributes most closely correlated with WTP when the information was most complete, and also in the overall evaluation of the different varieties. Peneau et al (2009), using direct elicitation by means of an open-ended questionnaire, asked respondents in Switzerland to write down what they understood by "freshness" in general, and for fruits and vegetables in particular. Their results suggest that freshness signifies a degree of closeness to the origin of the product, in terms of distance, time and processing.

Several studies have also investigated how consumers' willingness to purchase and to pay for fruit and vegetables are influenced by attributes such as (a) visual, smell and taste qualities (Ernst et al. 2006); (b) health related components (Moser et al. 2011; Onozaka et al. 2006; Boccaletti and Nardella 2000); (c) environmental attributes (Caputo et al. 2012; Mordeza et al. 2009); origin, local and farmers' support (Darby et al. 2008; Thilmany et al. 2008; Rodriguez-Ibeas 2007); (d) labels and certification (Caputo et al. 2012). Finally, in addition to these studies, there have been others which have focused on heterogeneity issues among consumers of fruit and

vegetables, pointing out that factors such as socio–demographic (Gao et al. 2011; Schafer et al. 1999), household (Macario and Sorenson 1998), psychological (Trudeau et al. 1998), and attitudinal (Gao et al., 2011; Moser et al. 2011) considerations all affect fruit and vegetable consumption.

While all of these studies have investigated either how consumers' preferences and perception of quality features of fruit and vegetable products impact on their purchasing behavior or on how socio–economic and behavioral factors affect fruit and vegetable consumption, only a few studies have examined the influence of consumers' lifestyles on their attitudes towards quality aspects of fruits and vegetables. The food-related lifestyle (FRL) approach was first developed by Grunert et al. (1993) and Brunsø and Grunert (1995). Then, it was applied in different cultural contexts (Wycherley et al. 2008; de Boer et al. 2004; Brunsø et al. 1995) and tested for cross-cultural validity (Scholderer et al. 2004). Applications of the FRL model aimed at describing people according to the role that food plays in their lives (Pérez-Cueto et al. 2010), linking generic food-related attitudes to the achievement of desired consequences (Brunsø et al. 2004). With regard to vegetable consumption a first application of this approach is reported in Nijmeijer et al. (2004), who investigated to what extent the food-related lifestyle model, adapted to include personal values (Schwartz 1992), predicts differences in the consumption of 24 vegetables among a sample of 276 South Australian consumers. Results confirm that vegetable consumption is linked to a number of contextual and cognitive factors such as personal values, perceived food attributes and cooking skills.

Although the FRL approach appears to be a very useful way of segmenting food consumers, to the best of our knowledge, no other published studies have used the FRL model for both fruit and vegetable consumption across adult food shoppers. Thus, the objective of our study is aimed at segmenting the Maltese consumers according to the FRL approach and at evaluating their attitudes toward quality features of fruit and vegetables, and investigating whether the segments identified have different attitudes in this respect. The main hypothesis of our study is that on the basis of their FRL, significantly different groups exist among Maltese consumers In addition, we hypothesize that these FRL-based clusters also differ in regard to the following characteristics: (i) quality perception for fruit and vegetables; (ii) awareness of quality marks; (iii) preferences regarding the origin of the product (local and foreign products); and geographical and socio demographic characteristics.

Data and Methods

To achieve our objective we designed a survey instrument which was partly derived from the Food Related Lifestyle (FRL) approach. Since the administration method of choice was the telephone survey, we needed to simplify the original instrument developed by Grunert (1993).
In our application, aspects such as (i) subjectivity of quality, (ii) consumer difference, (iii) intangible dimensions, (iv) information environment, and (v) price were identified and considered to be consistent in assessing Maltese consumers' perception of fresh fruit and vegetables, These aspects were translated into 18 variables that were selected from the 27 items identified by De Boer et al. (2004) in her research and which reflected all the elements identified by Grunert (1993). The choice of these variables was also validated by subsequent consultations with various stakeholders in the local food industry.

Finally, a technical committee was set up to discuss extra questions to be included in the questionnaire in order to fully describe the attitudes and perceptions of Maltese consumers towards fruit and vegetables. The final version of the questionnaire is divided into three sections, and consists of a total of 36 items. The first section includes a series of 11 questions that aim to analyze different aspects of consumers' purchasing behaviour, attitudes toward fruit and vegetables, consumer perception towards quality in fruit and vegetables, quality certification schemes and perception of Maltese products versus foreign products. The second section includes the FRL items. The third section includes questions on socio-demographic characteristics of the respondent such as gender, age, education level, locality of residence, household size.

The data was processed in two phases. First, we conducted a descriptive analysis to evaluate the Maltese consumers' purchasing behaviour and their attitudes toward fruit and vegetables, using questions asked in the first part of the questionnaire. Then, consumer groups were identified using the classical segmentation approach, i.e. factor analysis aimed at defining specific useful ways to describe consumers, and cluster analysis, aimed at grouping the individuals according to these specifications. Finally, we evaluated the resulting clusters according to socio-demographic and consumption habit variables and tested the clusters for differences in attitudes towards Maltese fresh fruit and vegetables.

Results

Sample Characteristics

The FRL study was conducted during February 2010 in Malta. Data was collected from 881 responses to a questionnaire administered by telephone interviewing. The sample was drawn from the dwellings registered by the National Statistics Office, the records of which are regularly updated through auxiliary sources. Households were selected so as to obtain a representative sample according to the locality of residence. Summary descriptive statistics for the characteristics of the full sample are presented in Table 1.

Purchasing and Consumption Habits

Results from a descriptive analysis suggest that more than 50% of respondents buy fresh fruit and vegetables from hawkers, 32% buy them from supermarkets whilst 8% buy their fruit and vegetables from Wet Markets. The remaining 6% buy their fresh fruit and vegetables either directly from the farmer or consume their home-grown products.

When asked about "quality" in association with fruit and vegetables, consumers identified product safety as the most important quality characteristic (43.2%), followed by taste (35.6%); while the use of environmentally-sound techniques was considered to be the most important quality attribute by a smaller group of respondents (20.5%).

More than 75% of the interviewees perceive "fresh-looking product" as an aspect that characterized superior quality fruit and vegetable products, followed by product presentation (8.6%), brand (6.4%), and higher price (3.6%), etc. In addition, a high percentage of the respondents

Table 1. Demographic Characteristics of the Sample

Socio-Demographic Characteristics		Socio-Demographic Characteristics	
Gender		*Weekly expenditure on food*	
Male	18.8%	Less than €51	7.6%
Female	81.2%	€51 - €100	41.2%
Education level		€101 - €150	25%
No formal education	1.5%	€151 - €200	9.2%
Pre-Primary/Primary	30.9%	€201 - €250	2.8%
Secondary	43.5%	more than €250	1.2%
Post-Secondary	12.5%	No Response	12.9%
Tertiary	11.0%	*District*	
No Response	0.7%	Southern Harbour	20.8%
Household size		Northern Harbour	30.4%
1 members	10.9%	South Eastern	15.1%
2 members	27.3%	Western	13.1%
3 members	23.8%	Northern	13.8%
4 members	27%	Gozo and Comino	6.8%
5 member	8.5%	*Age*	
6 members	1.9%	Minimum	18
7 members	0.2%	Maximum	90
8 or more members	0.3%	Mean	53.5
		St. deviation	14.58
Total	881	Total	881

state that they are willing to pay up to 10% more for products with higher quality attributes, such as fruit being tastier (64%), healthier (63.1%), local (58.7%) or grown using environmentally-friendly techniques (57.5%). Finally, a lower percentage (from 9 to16%) of the respondents are willing to pay up to 30% more for quality products, with taste being the attribute that consumers would be most willing to pay for.

Perception of Maltese Products vs Foreign Products

Our questionnaire also included a series of questions aimed at assessing consumers' perception of Maltese products versus foreign products. In our sample, 90% of the respondents stated that Maltese products differ from foreign products. In particular, the respondents who believed that Maltese fruit and vegetables are different, were asked whether this difference meant that fruit and vegetables of Maltese origin where better or worse than foreign ones in terms of authenticity, freshness, healthiness, environmental safeguards, and taste. For authenticity, freshness and taste, more than 90% believed that Maltese fruit and vegetables are superior regarding these characteristics, with less than 5% stating that the products are worse. However, regarding healthiness and safety characteristics, a lower percentage of the respondents believed that Maltese products are better than the foreign ones, especially with regard to safety. Finally, when asked to explain what the difference was due to, most of the respondents stated that it was due to the sun (84.9%) and soil (79.9%). Fewer believed that the difference was due to the minimal use of machinery in crop management (54.1%).

Attitudes Towards Labels

Most of the Maltese consumers in the survey considered safety as the most important quality aspect in fruit and vegetables. This aspect, however, is a credence attribute since it can only be claimed by the producer and cannot be checked by the consumer, either before or after purchasing. As earlier mentioned, consumers in our sample interpreted quality according to how the fruit and vegetables are presented and whether they look fresh. However, according to a wide body of literature, in a purchasing context where a product is characterized mostly by credence attributes, specific information provided by labeling schemes and brands might increase consumers' awareness of the presence of quality characteristics. However, in our study we found that 66% of respondents were not aware of the existence of quality marks; this explains why a high percentage of the consumers base quality perception on their sensory capacities.

The actual level of awareness of quality marks is even lower than the 34% derived from respondents' self-assessment since most of the consumers who believe that they are aware of these marks confuse private brands with public/collective quality marks (82%).

Finally, the questionnaire included a question concerning the amount of trust that consumers place in certification bodies. The results showed that producer organisations would be the most trusted to certify quality characteristics (43%) whilst 23% trust governmental departments with quality assurance. This came as quite a surprise since a producer making claims about his own product might be considered to be in conflict of interest and at risk of opportunistic behaviour. Akerlof (1970), highlights the problem of information asymmetry, which occurs when the seller knows more about the product than the consumer. The high percentage of consumers buying their fruit and vegetables predominantly from hawkers may explain a lot about the perception of the quality of fruit and vegetables in Malta. Hawkers in Malta are closely linked to producers. It is common for hawkers to market their own produce or that of their relatives. The result is usually that bad products are driving out the good ones. Even though locally-grown fruit and vegetables are preferred to foreign products due to the belief that they are superior in all regards, most of this perception may be attributed to the hawker's selling pitch.

Segmentation Analysis and Profiles: Food-Related Lifestyle Approach

In order to analyze Maltese consumers' attitudes towards quality in fruit and vegetables in relation to their Food-Related Lifestyles, we first investigated the relationship among the 18 FRL items using Principal Component Analysis (PCA) with Varimax rotation. Prior to performing PCA, the suitability of data for factor analysis was assessed. Even though inspection of the correlation matrix revealed the presence of few coefficients of 0.3 and above, the Kaiser-Meyer-Olkin KMO statistics were 0.677, exceeding the recommended value of 0.6 (Kaiser, 1974) and Bartlett's Test of Sphericity (Bartlett 1954) reached statistical significance, supporting the factorability of the correlation matrix.

Results from the PCA suggest that in this dataset the 18 variables used to analyze consumers' FRL may be grouped into six significantly different factors, thus explaining 51.67% of the variance. Analyzing factor loading of each variable among the factors extracted, we observe that they may be associated with: (i) the role of food in the consumer's social life, (ii) information on the products purchased, (iii) interest in experimenting with food, (iv) the practicality of buying

and consuming food, (v) the need to plan using a shopping list or a weekly menu, and the perception of food as a (vi) serious commitment for the household keeper. Table 2 shows the factors obtained from the PCA.

Table 2. Factors from Principal Components Analysis*

Variables[1]	Fact1	Fact2	Fact3	Fact4	Fact5	Fact6
Going out for dinner is a regular part of our eating habits.	**0.696**	-0.103	0.108	0.068	0.005	0.182
Dining with friends is an important part of my social life	**0.683**	0.004	0.201	-0.069	0.105	0.144
When I do not really feel like cooking, I get one of the other members of my family to do it.	**0.595**	0.025	-0.053	-0.121	-0.044	0.095
To me product information is of high importance. I need to know what the product contains.	0.037	**0.699**	0.027	-0.096	-0.035	0.219
I try to plan the amounts and types of food that the family consumes.	-0.107	**0.667**	0.042	0.049	0.147	-0.053
I like to buy food products in specialty stores where I can get expert advice.	0.162	**0.469**	0.186	0.309	-0.077	0.019
I make a point of using natural or ecological food products	-0.066	**0.637**	-0.049	-0.041	0.121	-0.052
Recipes and magazines articles from other cooking traditions make me experiment in the kitchen.	0.49	0.077	**0.799**	-0.021	0.142	0.014
I like to try new foods that I have never tasted before.	0.175	0.047	**0.771**	0.045	0.065	0.071
I only buy and eat foods which are familiar to me.	0.036	0.098	**-0.473**	0.466	0.211	0.204
I always check prices, even on small items.	-0.271	0.067	-0.021	**0.459**	0.174	*0.328*
I consider the kitchen to be the woman's domain.	-0.263	-0.090	-0.079	**0.714**	0.180	-0.124
In our house, nibbling has taken over and replaced set eating hours	*0.342*	0.007	0.142	**0.553**	-0.358	-0.072
Before I go shopping for food, I make a list of everything I need.	0.021	0.184	0.185	-0.008	**0.599**	0.201
I always plan what we are going to eat a couple of days in advance.	0.003	0.014	0.005	0.167	**0.758**	-0.12
Eating is to me a matter of touching, smelling, tasting and seeing; all the senses are involved.	0.127	0.114	0.052	-0.021	*0.336*	**0.496**
Cooking is a task that is best over and done with.	-0.191	0.127	0.059	0.247	0.039	**0.616**
Shopping for food is like a game to me	0.102	0.183	0.072	0.242	0.201	**-0.618**
Eigenvalue	2.290	2.179	1.468	1.231	1.097	1.039
Variance explained (% of total)	12.722	12.106	8.153	6.837	6.092	5.772
Cumulative variance explained (% of total)	12.722	24.828	32.981	39.818	45.911	51.682

* Bold values indicate higher correlation between variables and factors.
[1] Variables included in the PCA are expressed using 5-point scales.

The first component, labelled *social life* explains 12.72% of the total variance. It is characterized by variables indicating that the persons interviewed view food as having an important role in social life, i.e. entertainment gatherings of friends and family. The second factor is called *information* and accounts for 12.11% of the total variance. This factor collects variables showing consumers' interest in getting information on the characteristics of the food that they are consuming or buying. The third factor, labelled *experimentation*, explains 8.15% of the total variance. This factor is linked to variables showing neophilia or consumers' interest in trying out different things when they cook, whether it be food, ingredients or recipes. The fourth factor, labelled *practicality*, explains 6.84% of the total variance and is related to those variables indicating households which are dominated by women and which will buy food as long as it is convenient and familiar, even if this means that the food bought will take over mealtimes. The fifth factor, called *planning*, which helps to explain 6.09% of the total variance, collects variables indicating the degree to which planning is important for the household when it comes to the buying of food and the planning of the food that will be cooked for the set meals. Finally, the sixth factor, which explains 5.77% of the total variance, is labelled *serious commitment*. This is linked to variables

that can be associated with involvement of the interviewee with food as a compelling task. This factor showed a lack of enthusiasm for cooking and rigour and seriousness in shopping but, on the other hand, acknowledgement of the relevance of eating as an involving experience.

Based on the six factors obtained from the the PCA, we performed a cluster analysis, using a K-means clustering technique (Malhotra, 1993), to verify the presence of different food-related life-style segments in Malta. First, a Hierarchical Cluster Analysis was performed to get an indication of the most appropriate number of clusters, which was calculated by plotting the coefficients logged on the Agglomeration schedule against the stage number. This gave rise to a Scree plot, whose elbow indicated that the ideal number of clusters would be either 4 or 5. Finally, using the K-means clustering method, four clusters were identified. Relationships between identified clusters and socio-demographic variables were also analyzed. Results from the cluster analysis are shown in Table 3.

Table 3. Categories of Final Clusters

	Cluster 1 *Hedonistic*	Cluster 2 *Adventurous*	Cluster 3 *Bargain Seeker*	Cluster 4 *Traditional*
1 Social	.606	-.525	-.657	.436
2 Information	.765	-.417	.703	-.530
3 Experiment	.070	.767	-.227	-.688
4 Practical	.045	-.003	.520	-.313
5 Planning	-.071	-.122	.043	.149
6 Serious commitment	-.906	-.153	1.043	.247

The first segment is described as *hedonistic households***.** Hedonistic households are the most common type found on the Maltese islands, making up 31% of the entire sample. They have the lowest average number of members residing permanently in the household and consider food as an important social tool. This was seen from the high score in the item highlighting the importance of food as a social factor. They are not particularly aware of quality marks; on the other hand they are interested in knowing the characteristics of the food they usually buy and eat, showing particular preferences for products bearing quality labels or products sold by specialty stores. Their interest in the characteristics of food products leads them to experiment with new recipes, prepare unusual meals, and try out different culinary traditions. For these reasons, people in this segment are willing to pay extra for products when they satisfy their curiosity and gratify their senses.

The second segment is *adventurous households*, which accounts for 30% of the sample. As shown (Table 3) "experimentation" accounts for the highest single score of all the clusters, suggesting that consumers in this segment are interested in trying new food, new recipes and new ways of cooking, In addition, they are not particularly aware of quality products, allowing their senses to inspire and guide their shopping decisions, and the "information" score is quite low, indicating that when buying, adventurous households are driven mostly by their gut feeling, rather than by cognitive aspects. Finally, the low score attached to the social factor suggests that consumption of novelty foods takes place in private or with other members of the family rather than outside the household.

The third segment accounts for 20% of the sample and is classified as the *bargain seeker household*. This segment is different from the others in terms of the consumer's vision of food consumption and its demographic characteristics. In particular, the lower score in the social section suggests that unlike the others these households do not consider food to be important for their social life, viewing it as a means to satisfy their hunger. Unlike all the other segments, the higher score for "serious commitment" suggests that consumers in this segment prefer to dedicate shopping time to looking for products that offer good value for money rather than to cooking. These types of households might try to experiment with different foods but will only do so if the product is not extremely exotic and is cheaper than the food they are used to. Finally, with regard to demographic characteristics, responsibility for the acquisition of food in this household is not entirely attributed to the women, with 25% of the respondents being male. This segment has the lowest level of education and the highest average age amongst the clusters.

The fourth segment accounts for 19% of the sample. Consumers in this group agree that food favours socializing. They have the highest level of education and the highest average number of people residing permanently in the household. The average age of the person responsible for food shopping is the youngest amongst the clusters. This household is very reluctant to try out new recipes or experiment with other types of food, preferring only food that seems familiar to them. Since they base their food choice on what they are used to eating, product information is of little importance to them. On the other hand, consumers in these households are willing to pay a premium price for fruit and vegetables that guarantee quality. Even though we can see that they scored lowest in the "information" factor, these households are better informed on quality marks than the rest. Thus the label *traditional household***.**

Testing for Heterogeneity across Maltese Consumer Segments

To increase the usefulness of our segmentation results, we widened our analysis by testing whether belonging to an FRL consumer segment makes the respondent show different attitudes towards Maltese fresh fruit and vegetables. We did this by estimating a probit model, using as a dependent variable an attitudinal question indicating positive attitudes of Maltese consumers towards Maltese fruit and vegetables, while as a co-variate the cluster membership of the respondent. This model is not suitable for predicting consumer attitudes towards Maltese fresh fruit and vegetables, since a number of omitted variables, not available in our dataset, may be anticipated. However, given a statistically significant estimate, the cluster parameters are useful for evaluating whether; compared to Cluster 1 (which is the baseline) the respondent's belonging to a different cluster makes it more or less probable that they will declare a positive attitude towards local fruit and vegetables.

The model's specifications are reported in the following formula; the empirical model was estimated using the Maximum likelihood (ML) estimation method:

$$F\&V = \beta_0 + \beta_1 Cluster\,2 + \beta_2 Cluster\,3 + \beta_3 Cluster\,4$$

where the variables are as defined in Table 4.

Table 4. Description of Variables used in the Probit Models

Variables	
Dependent Variable	
F&V	1 if respondents have positive attitudes towards fresh fruit and vegetables from Malta; 0 otherwise.
Covariates	
Cluster1	1 if the respondent belongs to the *Hedonistic* cluster; 0 otherwise (Baseline).
Cluster2	1 if the respondent belongs to the *Adventurous* cluster; 0 otherwise.
Cluster3	1 if the respondent belongs to the *Bargain Seeker* cluster; 0 otherwise.
Cluster4	1 if the respondent belongs to the *Traditional* cluster; 0 otherwise.

Source: Survey data.

In the estimation procedure, Cluster 1 was chosen as the baseline scenario. Socio-demographic variables were also considered, but they have not been included in the final model since none of them were found to be statistically significant. Table 5 presents probit estimates and supporting statistics for each variable considered.

Table 5. Estimates of the probit models

Variables	**Coeff.**	**T-Stat**	
Constant	0.46	5.88	***
(Cluster2) *Adventurous*	0.21	1.81	*
(Cluster3) *Bargain Seeker*	0.40	3.09	***
(Cluster4) *Traditional*	-0.14	1.03	
LL	-515.5617		
Pseudo_R-squared	0.0224		

Source: Survey data. *** Significant at the 1% level; ** Significant at the 5% level

Since the parameters of all the variables but Cluster 4 are statistically significant, results suggest that Clusters 2 and 3 are different from Cluster 1 in terms of the likelihood of individuals belonging to the cluster having positive attitudes towards fruit and vegetables from Malta.

In order to investigate more deeply into whether all the clusters differ from each other in terms of fruit and vegetable attitudes, we performed three Wald tests to test for equality of the parameters for each pair of clusters. In accordance with the results shown in Table 6, we reject the hypothesis of equality at the 1% or 5% level for all clusters, except in the case of the comparison between clusters 2 and 3.

Table 6. Wald Tests across Clusters

Hypothesis	**Wald Test**	**P-Value**	**Significance**
H_0 = *Cluster 2=Cluster3*	2.09	0.1483	
H_0 = *Cluster 2=Cluster4*	6.46	0.0110	**
H_0 = *Cluster 3=Cluster4*	13.08	0.0003	***

Source: Survey data. *** Significant at the 1% level; ** Significant at the 5% level

In conclusion, probit estimates show that no significant difference exists between hedonistic and traditional consumer groups with regard to their positive attitudes towards Maltese fruit and vegetables, while the Wald tests suggest no significant difference exists between the adventurous and bargain seeker consumer groups in terms of the probability of its members having a positive attitude towards fruit and vegetables from Malta. In addition, the adventurous and bargain seeker Maltese consumer segments seem to be currently more positively oriented towards local fruit and vegetables.

Conclusions

In an attempt to support the establishment of a marketing strategy for fruit and vegetables based on quality, a survey was conducted to identify to what extent quality aspects are valued by local consumers. A market segmentation was performed using a questionnaire focusing on quality perception of fruit and vegetables and containing a reduced version of the FRL instrument. The results obtained were helpful in developing an understanding of Maltese consumers' general perceptions and also in suggesting which segments specific marketing strategies might be aimed at. Analysis of the first part of the questionnaire clearly shows that the market is still new to quality marks. This may be interpreted as an opportunity to design a quality scheme that caters specifically for Maltese consumers by involving producer organisations in the management of the system and promoting safety as the main quality feature. The challenge lies in getting the consumer to trust the quality attributes highlighted in the scheme more than the hawker's sales pitch. Analysis of the second part of the questionnaire sets out six components of FRL, defined as social life, information, experimentation, practicality, planning, and serious commitment. Using these six factors, we also identified four clusters: hedonistic, bargain seeker, adventurous, and traditional households. The four clusters identified can be used for the marketing of the product once the quality scheme is put in place. In addition, we also found that the clusters identified using the FRL differ also in terms of attitudes towards fruit and vegetable quality. In particular, we tested whether differences between the segments exist in the interest towards local Maltese fruit and vegetables. A relevant finding is that currently, while a quality mark for Maltese produce is not available on the market, the adventurous and bargain seeker consumer segments show a more positive attitude towards Maltese fruit and vegetables than the hedonistic and traditional segments.

This study thus provides relevant insights in terms of managerial implications. Our results indicate the importance of implementing appropriate marketing strategies in order to communicate the quality aspects of food in general and of fruit and vegetables in particular. In this situation, the adoption of diversified communication tools seems to be the most appropriate strategy, since consumers' attitudes toward quality aspects of fruit and vegetable products differ across the consumers groups identified. In fact, our findings suggest that a communication strategy for the introduction of a labelling program could be more effective if it is addressed to the adventurous and bargain seeker segments. However, it is worth noting that the results of our analysis do not exclude that a positive response may come also from the other segments, especially if it is supported by appropriate communication.

However, the study shows some limitations. Since we conducted this study using a reduced version of the FRL instrument proposed by Grunert, which has been cross-culturally validated, its

comparability with other studies that used the instrument in its complete form are questionable. Future research should analyze the FRL using the full version of the instrument and compare the results of the two studies. It would also be interesting to monitor the changes in FRL, conducting the survey in 10 years time to see whether there will be any changes in the segment size and whether new segments will appear.

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